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Three Essays on Taxation in Developing Countries

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Résumé :

Les revenus fiscaux représentent bien plus qu'un simple mécanisme de financement des dépenses publiques. Ils constituent un instrument essentiel des stratégies de développement économique. Un système fiscal performant est une condition nécessaire pour un développement économique fort, durable et inclusif, car il finance les dépenses publiques en infrastructure physique, sociale et administrative qui permettent aux entreprises de démarrer ou de se développer. Dans ce contexte, les revenus fiscaux constituent un levier essentiel pour financer le développement, notamment dans les pays en développement où la marge de manœuvre budgétaire est souvent restreinte. Cette thèse étudie les déterminants institutionnels et économiques de la mobilisation des recettes fiscales, à travers trois essais empiriques centrés sur les effets de la corruption, de la qualité institutionnelle et des réformes fiscales. Le premier essai analyse l'effet de la corruption désagrégée sur les recettes fiscales dans les pays en développement. L'étude met en évidence une relation non linéaire en forme de courbe en cloche : à faible intensité, la corruption peut temporairement faciliter la collecte des recettes fiscales en réduisant les lenteurs administratives, mais au-delà d'un certain seuil, elle devient préjudiciable en favorisant l'évasion fiscale et en sapant la confiance dans les institutions. L'utilisation d'indicateurs désagrégés montre que l'effet de la corruption varie selon ses dimensions, soutenant partiellement l'hypothèse du « grease the wheels » dans des contextes institutionnels faibles. Le deuxième essai examine le rôle de la qualité des institutions sur les recettes fiscales à travers le canal de transmission des investissements directs étrangers (IDE). En mobilisant un modèle d'équations structurelles (SEM), l'étude révèle que la qualité institutionnelle a un effet direct positif important sur les recettes fiscales. Toutefois, l'effet indirect via les IDE reste plus limité, surtout dans les pays à faible revenu, où les incitations fiscales généreuses, l'informalité et l'évasion fiscale peuvent nuire à la mobilisation des ressources. Le troisième essai applique la méthode du contrôle synthétique pour évaluer l'impact de l'introduction de la taxe sur la valeur ajoutée (TVA) en Tunisie en 1988 sur l'efficacité économique ainsi que sur deux canaux de transmission: stock de capital et productivité totale des facteurs. Des tests de robustesse, y compris des placebo temporels et des tests de sensibilité au choix des variables et des unités de contrôle, confirment la stabilité et la validité des résultats. L'introduction de la TVA a eu un effet significatif sur l'efficacité économique du pays, mais sa portée demeure limitée, en raison de l'existence de l'évasion fiscale et de l'ampleur du secteur informel.

Mots clés : Corruption, Recettes fiscales, Qualité institutionnelle, Investissement Direct Etranger, Pays en développement, Tunisie, Taxe sur la valeur ajoutée, Efficience économique.

Three essays on Taxation in Developing Countries**Abstract :**

Tax revenues represent far more than a simple mechanism for financing public expenditure. They are a fundamental instrument of economic development strategies. An efficient tax system is a necessary condition for strong, sustainable, and inclusive economic growth, as it finances public spending on physical, social, and administrative infrastructure that enables businesses to start up or expand. In this context, tax revenues serve as a key lever for financing development, particularly in developing countries where fiscal space is often constrained. This dissertation examines the institutional and economic determinants of tax revenue mobilization through three empirical essays focused on the effects of corruption, institutional quality, and tax reforms. The first essay analyzes the effect of disaggregated corruption on tax revenues in developing countries. The study highlights a non-linear, inverted U-shaped relationship: at low levels, corruption may temporarily facilitate tax collection by reducing bureaucratic inefficiencies, but beyond a certain threshold, it becomes detrimental by promoting tax evasion and undermining trust in institutions. The use of disaggregated indicators shows that the impact of corruption varies across its dimensions, partially supporting the "grease the wheels" hypothesis in weak institutional settings. The second essay investigates the role of institutional quality on tax revenues through the transmission channel of foreign direct investment (FDI). Using a Structural Equation Model (SEM), the analysis reveals that institutional quality has a strong direct positive effect on tax revenues. However, the indirect effect through FDI remains limited, particularly in low-income countries where generous tax incentives, informality, and tax evasion can hinder revenue mobilization. The third essay applies the synthetic control method to assess the impact of the introduction of the value-added tax (VAT) in Tunisia in 1988 on economic efficiency and two transmission channels: capital stock and total factor productivity (TFP). Robustness checks, including temporal placebos and sensitivity tests regarding the choice of variables and control units, confirm the stability and validity of the results. The introduction of the VAT had a significant positive effect on the country's economic efficiency, although its scope remains constrained by the persistence of tax evasion and the size of the informal sector.

Keywords: Corruption, Tax Revenue, Institutional Quality, Foreign Direct Investment, Developing Countries, Tunisia, Value-Added Tax, Economic efficiency.

Je dédie cette thèse à ma famille, en particulier à mes parents, qui ont été mon plus grand soutien tout au long de mon parcours éducatif.

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List of Abbreviations

CPI Consumer Price Index

EFW Economic Freedom of the World

RMSPE Root Mean Square Prediction Error

SRMR Standardized Root Mean Square Residual

ATT Average Treatment Effect on the Treated

CD Critical Difference

CGI Composite Governance Index

DRC Democratic Republic of Congo

EAP East Asia and Pacific

FDI Foreign Direct Investment

FE Fixed Effects

GDP Gross Domestic Product

GMM Generalized Method of Moment

GRD Government Revenue Dataset

HC Human Capital

HIC High Income Countries

ICRG International Country Risk Guide

ICTD International Centre for Tax and Development

IMF International Monetary Fund

IQ Institutional Quality

IV – GLS Instrumental Variables – Generalized Least Squares

KMO Kaiser-Meyer-Olkin

LAC Latin America and the Caribbean

LIC Low-Income Countries

LOO Leave-One-Out

MENA Middle East and North Africa

MIC Middle-Income Countries

ODA Official Development Assistance

OLI Ownership, Location, Internalization

OLS Ordinary Least Squares

PCA Principal Component Analysis

PRS Political Risk Services

REER Real Effective Exchange Rate

RGDPNA Real Gross Domestic Product at National Accounts

SCM Synthetic Control Method

SEM Structural Equation Modeling

SSA Sub-Saharan Africa

SUR Seemingly Unrelated Regression

UAE United Arab Emirates

UNCTAD United Nations Conference on Trade and Development

V – Dem Varieties of Democracy

VAT Value Added Tax

WDI World Development Indicators

WGI World Governance Indicators

Table of contents

Acknowledgements	vii
List of Abbreviations	ix
List of figures	xvii
List of tables	xix
Introduction générale	1
Contexte et objectifs de la thèse	1
La qualité institutionnelle : notions clés et outils d'évaluation	6
Contribution de la thèse	10
1 Corruption and Tax Revenue Mobilization in Developing Countries: Evidence from a Disaggregated and Nonlinear Analysis	17
1.1 Introduction	18
1.2 Theoretical foundations of the relationship between corruption and public revenue	21
1.3 Review of the empirical literature	23
1.4 Data and descriptive analysis	26
1.5 Model and estimation method	32
1.5.1 Linear model nexus between corruption and tax revenue	32
1.5.2 Non linear nexus between corruption and tax revenue	36
1.6 Estimates and interpretations of results	37
1.6.1 Results of the overall index	37
1.6.2 Decomposition of corruption	40
1.6.3 Nonlinear model results	44
1.7 Robustness tests	52
1.8 Conclusions	54
1.9 Annex 1	55

2	The Effect of Institutional Quality on Tax Revenue via the FDI Transmission Channel	65
2.1	Introduction	66
2.2	Literature review	68
2.2.1	Literature on institutional quality	68
2.2.2	Literature on Foreign direct investment	70
2.2.3	Literature on Tax revenue	72
2.2.4	Literature gaps	73
2.3	Stylized Facts	74
2.4	Data and Estimation strategy	78
2.4.1	Principal component analysis (Pca)	82
2.4.2	Non recursive Model	83
2.4.3	Recursive model: Mediation model	84
2.5	Results	86
2.5.1	Sub-sample heterogeneities.	91
2.6	Robustness check	96
2.7	Conclusions and implications	102
2.8	Appendices	104
2.8.1	Appendix A : Correlation matrices	104
2.8.2	Appendix B : Principal component analysis	105
2.8.3	Appendix D : Variable Definitions	106
2.8.4	Appendix E : List of countries	109
3	Value-added taxation and Economic Efficiency : Evidence from Tunisian Experience	111
3.1	Introduction	112
3.2	Tunisian Tax System and reform of 1988	114
3.2.1	Trend and structure of tax revenue	114
3.2.2	Evolution of Tunisian VAT	116
3.3	Related Literature	120
3.3.1	VAT and labor productivity: theoretical mechanisms	120
3.3.2	VAT in MENA countries	122
3.3.3	Overview of empirical research	124
3.4	Data and Methodology	125
3.4.1	Why Synthetic Control Method?	125
3.4.2	Synthetic Control Method	127
3.4.3	Pre-Treatment Fit Index	129

3.4.4	Inference	130
3.4.5	Treated unit and potential controls	131
3.4.6	Variables and Data sources	132
3.5	Results and Discussion	135
3.5.1	The effect of VAT on Economic efficiency	136
3.5.2	The effect of VAT through transmission channels	141
3.6	Robustness	150
3.7	Generalizability of Tunisia's VAT Experience	151
3.8	Conclusion	153
3.9	Annex 3.	156

List of figures

1.1	Correlation between corruption and the ratio of government revenue to GDP, Source: V-Dem and ITCD	30
1.2	Outliers identification in terms of inflation by means calculation	31
1.4	Non linear Relationship	51
1.5	Fractional polynomial: The scatter plot is corruption versus Tax revenue. The line is the best fit quadratic function.	56
1.6	Scatter plots fitted with local polynomial smoothing	57
2.1	FDI and Tax revenue- country averages 1990-2017	75
2.2	FDI as % of GDP- average by country income group	75
2.3	Tax revenue % GDP-average by country income group	76
2.4	Principal component Governance across country income groups-average across all countries	77
2.5	Outliers identification by means calculation	82
2.6	Expected relationships from literature and found results	84
2.7	Mediation modelling	87
2.8	Hypotheses validation	91
3.1	Tunisia's Average Tax Structure (1986–2016): Aggregated vs Detailed	115
3.2	Evolution and structure of tax revenues in Tunisia	117
3.3	Evolution of tax revenues, indirect taxes and VAT in % GDP in Tunisia during 1986-2016	118
3.4	Evolution of tax revenues, indirect taxes and VAT in Millions of Dinars in Tunisia during 1986-2016	118
3.5	Evolution of Shadow Economy index and Shadow Economy % GDP in Tunisia during 1986-2016	119
3.6	Evolution of investment in Tunisia during 1986-2018	119
3.7	The gap in Real GDP per worker between actual and synthetic Tunisia	138

3.8	The gap in Capital stock per worker between actual and synthetic Tunisia . .	143
3.9	The gap in Total Factor Productivity between actual and synthetic Tunisia . .	146
3.10	In-time placebo test: fake treatment year = 1985	157
3.11	In-time placebo test: fake treatment year = 1983	158
3.12	Leave one out test: Output per worker	159
3.13	Alternative economic efficiency: Expenditure-side	160
3.14	Robustness check by dropping the year of Direct taxes reform :1987	161
3.15	Robustness check by dropping Inflation	162
3.16	The TFP gap between actual and synthetic Tunisia, excluding the 1990–1994 war period in Rwanda	163
3.17	3: Graphs for the in-time placebo test with fake treatment time : "1980": TFP .	164
3.18	Leave one out test: TFP	165
3.19	Leave one out test: Capital stock	166

List of tables

1.1	Descriptive statistics	29
1.2	Fisher-type unit-root test based on Dickey-Fuller test	33
1.3	Fisher-type unit Root test Based on Phillips-Perron test	33
1.4	The impact of corruption(WGI and V-DEM) on total taxes, indirect and direct taxes	39
1.5	The impact of disaggregated corruption (V-DEM) on total tax revenue	42
1.6	Impact of disaggregated corruption (V-DEM) on direct and indirect taxes	43
1.7	Quadratic Estimation and Threshold Analysis of Corruption (V-DEM) on Total Tax Revenue	47
1.8	Quadratic estimation of disaggregated corruption (V-DEM) on total tax revenue	48
1.9	Threshold Analysis of Disaggregated Corruption (V-DEM) on Total Tax Revenue	49
1.10	Variable definitions and sources	58
1.11	Robustness Check: Adding Control Variables	60
1.12	Robustness Check: Dropping Control Variables	61
1.13	Impact of disaggregated corruption (V-DEM) on direct and indirect taxes	62
1.14	Robustness check excluding outliers in terms of inflation	63
2.1	Descriptive Statistics (Dependent and Independent Variables)	79
2.2	Descriptive statistics (Governance indicators)	80
2.3	Baseline estimation : Full sample	94
2.4	Sub-sample heterogeneities	95
2.5	Robustness using additional control variables :Full sample	98
2.6	Robustness check using Sys-GMM	99
2.7	Robustness using alternative Independent variable with alternative methods: Full sample	100
2.8	Robustness check dropping outliers: Full sample	101
2.9	Correlation matrix (Equation 1)	104
2.10	Correlation Matrix (Equation 2)	104

2.11	Correlation matrix (Pca1: Institutions)	104
2.12	Correlation matrix (Pca2: Cultural conflicts)	105
2.13	Correlation matrix (Pca3: Economic conditions)	105
2.14	Component indexes names and constituent variables	105
2.15	Variable Definitions and Sources	106
2.16	Variable Definitions and Sources	107
2.17	Variable Definitions and Sources	108
2.18	List of countries	109
3.1	Descriptive Statistics	133
3.2	Summary of Variables	133
3.3	Country Weights	137
3.4	Balancing Properties	137
3.5	Prediction results in the post-treatment periods (Economic efficiency)	140
3.6	Country Weights (Capital stock)	142
3.7	Balancing Properties (Capital stock)	142
3.8	Prediction Results in the Post-Treatment Periods (Capital per Worker)	144
3.9	Country Weights (TFP)	145
3.10	Balancing Properties (TFP)	145
3.11	Prediction Results in the Post-Treatment Periods (TFP)	147
3.12	Transmission channels: magnitudes and significance	148
3.13	Comparative Averages: Labour Productivity and Shadow Economy	156

Introduction générale

Contexte et objectifs de la thèse

Comme le soulignent Besley and Persson ([2009](#)) dans leur article, « l'expérience historique des pays développés montre que la création d'une capacité étatique à collecter efficacement l'impôt constitue un aspect central du développement ». Cette observation met en évidence l'importance déterminante de la collecte de l'impôt dans les trajectoires de développement économique. Elle conduit naturellement à une question fondamentale de l'économie du développement : pourquoi certains pays parviennent-ils à mobiliser efficacement leurs ressources fiscales afin de financer leur développement, tandis que d'autres peinent encore à y parvenir ? L'importance des recettes fiscales dans le fonctionnement des États est largement reconnue, puisqu'elles conditionnent leur capacité à fournir des biens publics, à réduire les inégalités et à soutenir la croissance économique.

Pendant longtemps, la littérature en économie publique s'est concentrée sur les déterminants strictement économiques de la fiscalité. Elle a ainsi mis en évidence l'importance de l'assiette fiscale : une assiette large permet de maintenir un rendement élevé tout en réduisant les taux, limitant ainsi les distorsions (Atkinson and Stiglitz [1976](#)), tandis qu'une assiette étroite concentre la charge fiscale et encourage l'évasion et l'informalité. Dans la lignée de la théorie de la fiscalité optimale initiée par Ramsey ([1927](#)), l'accent a également été mis sur la structure des taux d'imposition et leur impact sur l'efficacité économique. L'idée fondatrice est que

l'impôt doit être conçu de manière à minimiser les distorsions qu'il engendre dans les choix de production et de consommation, tout en garantissant un niveau suffisant de recettes. Les travaux de P. A. Diamond and Mirrlees (1971) sont venus renforcer ce cadre en soulignant la nécessité de ne pas taxer les intrants intermédiaires, afin de préserver l'efficacité de la production. Enfin, le degré d'ouverture commerciale a également été identifié comme un facteur déterminant de la mobilisation fiscale. Dans les économies fortement ouvertes, la dépendance vis-à-vis des droits de douane expose les États aux chocs externes et à la libéralisation commerciale (Tanzi 1992). Cette situation a conduit à une réflexion sur la substitution progressive des recettes douanières par des impôts intérieurs plus stables, tels que la taxe sur la valeur ajoutée (M. Keen and Ligthart 2002).

Dans les années récentes, de nombreuses études ont souligné le rôle central des institutions dans le processus de mobilisation des recettes fiscales. Comme l'ont montré North (1990), puis Acemoglu, Johnson, and Robinson (2001) and Acemoglu, Johnson, and Robinson (2005), la qualité institutionnelle constitue un déterminant fondamental, non seulement de la croissance économique, mais aussi de la performance fiscale. Les pays dotés d'institutions inclusives, crédibles et stables parviennent plus aisément à mobiliser des ressources internes et à réduire leur dépendance vis-à-vis de financements externes.

North (1990) illustre cette idée à travers l'exemple historique de la Glorious Revolution de 1688-1689 en Angleterre. En limitant le pouvoir absolu de la monarchie au profit d'un Parlement plus fort, cette révolution a consolidé les droits de propriété et établi des institutions durables telles que l'état de droit et le contrôle parlementaire des finances. Cette évolution institutionnelle s'est traduite par une augmentation significative et soutenue des recettes fiscales. (Une meilleure qualité institutionnelle, incarnée par la responsabilité politique, la transparence budgétaire, l'état de droit, et la capacité administrative, permet d'améliorer la collecte des impôts et d'accroître la capacité de l'État à financer ses politiques, y compris par l'endettement à bon coût.)

D'un point de vue empirique, la mise en place d'indicateurs de qualité institutionnelle au cours des années 1990 a suscité un important renouvellement de la littérature consacrée au rôle des institutions. Les analyses empiriques soulignent généralement une corrélation positive entre la robustesse institutionnelle et l'efficacité budgétaire et fiscale, entendue comme l'aptitude de l'État à mobiliser de manière optimale les ressources fiscales en vue de financer des dépenses publiques productives, indispensables au fonctionnement et à la dynamique de l'économie. Plusieurs travaux mettent ainsi en évidence que l'efficacité de la collecte fiscale dépend étroitement de la qualité des institutions (Ghura 1998; Tanzi and H. R. Davoodi 2000; Patrick Amir Imam and Jacobs 2014). Certains auteurs considèrent même que l'efficacité fiscale et la performance institutionnelle constituent des notions intrinsèquement liées, tant leur interdépendance apparaît structurelle (Huang and Wei 2006; Hefeker 2010; Minea and Villieu 2010; Dimakou 2013).

Par ailleurs, la corruption entretient une relation complexe avec la mobilisation des recettes fiscales. D'un côté, elle fragilise l'autorité de l'État, érode l'assiette fiscale à travers la fraude, l'évasion ou la sous-déclaration, et réduit la confiance des contribuables (Alm, Bahl, and Murray 1991; Tanzi 1998; Gupta, Hamid Davoodi, and Tiongson 2001; Sen Gupta 2007; Thornton 2008; Attila, Chambas, and Combes 2009; Phuong 2015; Baum et al. 2017; Epaphra and Massawe 2017). De l'autre, une partie de la littérature ancienne a avancé que la corruption pouvait, dans certains contextes, jouer un rôle de « lubrifiant ». Dès les années 1960, Leff (1964), Leys (1965) et Nye (1967) ont défendu l'idée qu'elle pouvait faciliter l'activité économique en contournant les rigidités administratives et en accélérant les processus décisionnels. Dans la même perspective, Huntington (1968) a soutenu que, dans des systèmes bureaucratiques lourds et inefficaces, la corruption pouvait « huiler les rouages » en permettant aux agents économiques d'échapper à des réglementations excessives. Appliquée à la sphère fiscale, cette idée suggère que, dans des environnements institutionnels fortement contraignants, la corruption pourrait temporairement favoriser la collecte et même contribuer à un accroissement

ponctuel des recettes. Toutefois, ces effets restent ambigus et de court terme : en affaiblissant la crédibilité de l'État et en institutionnalisant des comportements de fraude, la corruption compromet durablement la mobilisation fiscale et la stabilité macroéconomique (Méon and Sekkat 2005; Attila, Chambas, and Combes 2009). Plus largement, certains travaux mettent en évidence l'existence de relations non linéaires entre corruption et recettes fiscales, suggérant que ses effets varient selon le niveau de corruption ou le contexte institutionnel (Méon and Sekkat 2005; Méon and Weill 2010; Bogetić and Naeher 2024a). Dans certaines économies émergentes caractérisées par des niveaux intermédiaires de corruption et des besoins pressants de financement, ces relations ambivalentes méritent une analyse approfondie.

Au-delà de la corruption, la qualité institutionnelle influence directement et indirectement les recettes fiscales. Sur le plan direct, de meilleures règles du jeu et une administration plus efficace accroissent la conformité des contribuables, réduisent les coûts de transaction et améliorent la capacité de l'État à recouvrer l'impôt. Sur le plan indirect, des institutions crédibles, État de droit, stabilité politique, régulation prévisible renforcent l'attractivité de l'investissement direct étranger, ce qui peut élargir l'assiette fiscale via l'emploi, la productivité et la rentabilité des entreprises (Knack and Keefer 1995; Tanzi and H. R. Davoodi 2000; Zee, Stotsky, and Ley 2002; Alfaro et al. 2004; Staats and Biglaiser 2012; Saidi, Ochi, and Ghadri 2013). À l'inverse, des institutions faibles ou instables découragent les IDE et limitent la capacité des États à générer des ressources internes suffisantes.

Enfin, les réformes fiscales constituent un instrument crucial pour renforcer la mobilisation et moderniser les systèmes fiscaux qui touche à la fois de larges choix de politique économique et des questions précises de conception et d'administration de l'impôt. Parmi elles, l'introduction de la taxe sur la valeur ajoutée qui a représenté l'une des réformes les plus marquantes depuis les années 1980 dans les pays en développement (Ebrill, M. M. Keen, and M. V. P. Perry 2001; M. Keen 2008). Les origines conceptuelles de la TVA remontent à Wilhelm von Siemens, qui l'avait proposée comme alternative plus efficiente à l'impôt sur le

chiffre d'affaires allemand. Sa formulation pratique et sa mise en œuvre sont généralement attribuées à Maurice Faure et Carl Shoup, avec l'introduction en France en 1954, premier cas d'application exhaustive de la TVA à tous les secteurs (Smith, Islam, and Moniruzzaman 2011). Dès l'origine, la TVA s'est révélée une source fiable de recettes publiques : sa simplicité relative, sa transparence et la prévention de la taxation en cascade ont favorisé sa diffusion rapide et son adoption par de nombreux pays. Elle est aujourd'hui considérée comme l'une des innovations fiscales majeures, ayant remplacé des taxes sur le chiffre d'affaires moins efficaces grâce à sa neutralité, sa praticabilité administrative et son rendement (M. Keen and Lockwood 2010).

Sur le plan théorique, la TVA s'inscrit dans les principes centraux des finances publiques. Le théorème d'efficacité de production de P. A. Diamond and Mirrlees (1971) recommande d'éviter de distordre les décisions de production des entreprises ce que réalise une TVA moderne qui ne taxe que la consommation finale et crédite intégralement les intrants. Elle s'appuie aussi sur le principe de neutralité fiscale (Martinez-Vazquez and R. M. Bird 2011). Du point de vue de la croissance endogène, une fiscalité efficace protège l'épargne et l'investissement et finance des biens publics essentiels (éducation, santé, infrastructures), soutenant la croissance de long terme (Paul M. Romer 1989; Barro 1990). Enfin, dans les économies où l'informalité est importante, le système de crédit-facture multistade de la TVA crée de la documentation et des incitations à la conformité le long de la chaîne, souvent supérieures à celles d'un impôt sur le revenu (M. Keen 2008). Ces avantages théoriques ne se matérialisent toutefois pas toujours. Dans de nombreux pays en développement, une capacité administrative limitée, des exemptions étendues et des barèmes complexes sapent la neutralité et facilitent l'évasion (Ebrill, M. M. Keen, and M. V. P. Perry 2001; Schneider 2005; Alm and Embaye 2013; Bourass and Naima 2024). Dans ces contextes, la TVA peut présenter des effets régressifs à court terme, réduire le pouvoir d'achat et imposer des coûts de conformité élevés aux petites entreprises, surtout

lorsque l’informalité est diffusée et l’enforcement faible (Piggott and Whalley 2001; Hines Jr 2004; Emran and Stiglitz 2005; Coolidge 2012).

C’est dans cette perspective que s’inscrit cette thèse, qui analyse trois dimensions interdépendantes de la mobilisation des recettes fiscales. Le premier chapitre étudie l’impact de la corruption sur les recettes fiscales, en mettant en évidence une relation non linéaire concave. Le deuxième chapitre explore le rôle des institutions dans la mobilisation des recettes fiscales, en particulier à travers leur effet sur les flux d’IDE. Enfin, le troisième chapitre évalue l’impact de l’introduction de la TVA sur l’efficacité économique, mesurée par la productivité du travail.

À travers ces trois axes, cette recherche entend contribuer à une meilleure compréhension des conditions institutionnelles et fiscales qui permettent d’améliorer durablement la mobilisation des ressources internes et de soutenir les trajectoires de croissance et de développement économique.

La qualité institutionnelle : notions clés et outils d’évaluation

Selon North (1990), les institutions correspondent à l’ensemble des contraintes mises en place par les individus pour encadrer et organiser leurs interactions. Elles regroupent à la fois des contraintes formelles (telles que les lois, les constitutions ou les règlements) et des contraintes informelles (comme les normes sociales, les conventions ou encore les codes de conduite intériorisés), auxquelles s’ajoutent les modalités de leur mise en œuvre. Dans la même perspective, Brennan (2015) définit les institutions comme un ensemble de règles permettant de déterminer qui est habilité à prendre des décisions dans un domaine donné, quelles actions sont autorisées ou interdites, quelles procédures doivent être suivies, quelles informations doivent être diffusées ou non, ainsi que la répartition des bénéfices en fonction des comportements adoptés. La qualité institutionnelle peut alors être comprise comme le degré d’efficacité et de performance de ces règles et contraintes.

La plupart des études empiriques s'appuient sur les indicateurs de l'International Country Risk Guide (ICRG) et/ou ceux élaborés par la Banque mondiale. Dans cette thèse, nous mobiliserons principalement ces indicateurs, ainsi que la base de données Varieties of Democracy (V-Dem). L'exploitation de V-Dem, encore rarement mobilisée dans ce champ, constitue l'une des originalités de ce travail. L'ICRG propose depuis 1984 des notations mensuelles pour 141 pays. Il étudie trois types de risque : le risque économique qui est noté sur 50, le risque financier également noté sur 50 et le risque politique (ou institutionnel) noté sur 100. Dans cette base de données, la qualité institutionnelle est mesurée par douze sous-indicateurs qui proposent des notes variant de 0 à 4, 0 à 6 ou 0 à 12 en fonction de l'importance relative du sous-indicateur dans la qualité institutionnelle globale. Certains sous-indicateurs, en particulier ceux qui proposent une échelle de notation de 0 à 12, dérivent eux-mêmes de « sous-sous indicateurs ». Bien que l'usage des indicateurs de l'ICRG soit largement répandu, tant au niveau académique que dans le secteur privé, ils présentent un certain nombre de limites sur le plan méthodologique. Tout d'abord, ils sont déterminés sur la base d'enquêtes d'opinion conduites par les experts du groupe PRS (Political Risk Services). Ensuite, contrairement à d'autres bases de données, ces indicateurs ne sont pas disponibles en libre accès. Enfin, comme le souligne Roca (2011), la principale limite des indicateurs de l'ICRG réside dans l'absence d'intervalle de confiance. Plus populaires encore que ceux de l'ICRG, les indicateurs de gouvernance développés par Kaufmann, Kraay, and Zoido-Lobaton (1999) pour le compte de la Banque mondiale (indicateurs WGI aussi appelés indicateurs KKZ¹ cherchent à apporter des réponses à ces limites. La Banque mondiale développe six indices de qualité institutionnelle : voice and accountability, political stability, government effectiveness, regulation quality, rule of law et control of corruption. Selon Kaufmann, Kraay, and Zoido-Lobaton (1999), ces six indicateurs renvoient à trois dimensions fondamentales de la qualité institutionnelle. Les deux premières variables décrivent « le processus par lequel les gouvernements sont sélectionnés, contrôlés et

¹Le sigle KKZ désigne les initiales des personnes à l'origine de cette base de données : Kaufmann, Kraay et Mastruzzi.

remplacés ». Les deux variables suivantes décrivent « la capacité du gouvernement à formuler et mettre en place des politiques adéquates ». Les deux dernières variables définissent enfin « le respect des citoyens et de l'État vis-à-vis des institutions qui régissent les interactions économiques et sociales ». Contrairement à la base de données de l'ICRG, les indicateurs de développement de la Banque mondiale sont libres d'accès et fournissent des intervalles de confiance pour chaque dimension de la qualité institutionnelle. Par ailleurs, ils présentent l'avantage de constituer la base de données sur la qualité institutionnelle qui couvre le plus grand nombre de pays sur une période de plus de 20 ans (plus de 210 pays pour chacune des variables de qualité institutionnelle). En outre, les indicateurs WGI sont construits à partir de 37 bases de données différentes et agrègent toute l'information qu'elles contiennent. Il s'agit donc d'indicateurs composites contrairement aux indicateurs de l'ICRG. Ces multiples avantages expliquent la popularité des indicateurs WGI. Toutefois, à l'instar des indicateurs de l'ICRG, la subjectivité qui préside à la construction des indicateurs WGI fait qu'ils présentent également un certain nombre limites ². Dans cette thèse, nous exploitons également la base Varieties of Democracy (V-Dem), mais uniquement pour ses indicateurs de corruption. Cette focalisation fine sur les différents types de corruption, à partir d'un jeu de données multidimensionnel et désagrégé, constitue une contribution originale et une nouveauté de cette thèse à la conceptualisation et à la mesure du phénomène. En 2019, V-Dem couvrait 202 pays sur une longue période allant de 1789 à 2018.

L'indice de corruption de V-Dem se distingue par son échelle de 0 à 1 (0 = moins corrompu, 1 = plus corrompu), alors que la plupart des autres indices V-Dem vont de « moins démocratique » à « plus démocratique ». Il capte la petite comme la grande corruption, qu'elle affecte l'élaboration des lois (législatif) ou leur mise en œuvre (exécutif, secteur

²On peut relever au moins trois limites majeures. Premièrement, les WGI héritent des faiblesses de leurs sources composantes par exemple le manque de précision ou l'opacité méthodologique de certains indicateurs (Freedom House, The Heritage Foundation, etc.) utilisés pour bâtir l'agrégat. Deuxièmement, ils sont exposés à des biais idéologiques dans la définition et la sélection des variables. Troisièmement, ils peuvent subir des biais statistiques de pondération, liés au poids accordé aux différentes sources. S'y ajoute une hypothèse particulièrement discutable : l'indépendance des erreurs de mesure entre sources, rarement vérifiée en pratique. Pour une analyse détaillée de ces limites, voir OCDE (2006) et Roca (2013).

public, judiciaire). Concrètement, l'indice de corruption politique est la moyenne à parts égales de quatre composantes : corruption du secteur public , de l'exécutif , du législatif et du judiciaire avec un ajustement pour les pays sans législature (moyenne sur les trois autres composantes). En complément, l'indice de corruption du régime cible spécifiquement les titulaires de charges politiques dans une perspective néopatrimoniale. Atouts par rapport à WGI/Kaufmann et ICRG : V-Dem offre une désagrégation par sphères institutionnelles (exécutif, législatif, judiciaire, secteur public) permettant d'identifier les canaux de la corruption, publie des mesures d'incertitude issues d'un cadre bayésien (utile pour les tests de robustesse), propose une couverture historique étendue (pays/année sur le long terme), et met à disposition une documentation transparente ainsi que des données largement accessibles et répliquables. À l'inverse, WGI fournit surtout un score agrégé (utile pour des comparaisons synthétiques) et ICRG, bien que fréquent et ancien, reste plus propriétaire et moins détaillé sur les dimensions internes de la corruption. Toutes les mesures de qualité institutionnelle utilisées dans cette thèse sont présentées dans le tableau ci-dessous.

Couverture des principales bases d'indicateurs institutionnels

Indicateur	Source	Pays & territoires	Horizon temporel
Political corruption	V-Dem	202	1789–2024
Executive corruption	V-Dem	202	1789–2024
administrative corruption	V-Dem	202	1789–2024
Judicial corruption	V-Dem	202	1789–2024
Legislative corruption	V-Dem	202	1789–2024
Regime corruption	V-Dem	202	1789–2024
Control of corruption	WB WGI	212	1996–2023
Corruption	ICRG /PRS Group	141	1984–2024 ³
Government stability	ICRG /PRS Group	141	1789–2024
Internal conflict	ICRG /PRS Group	141	1789–2024
External conflict	ICRG /PRS Group	141	1789–2024
Military in Politics	ICRG /PRS Group	141	1789–2024
Religious Tensions	ICRG /PRS Group	141	1789–2024
Law and order	ICRG /PRS Group	141	1789–2024
Ethnic Tensions	ICRG /PRS Group	141	1789–2024
Socio-economic conditions	ICRG /PRS Group	141	1789–2024
Bureaucracy quality	ICRG /PRS Group	141	1789–2024
Democratic and accountability	ICRG /PRS Group	141	1789–2024
democracy/autocracy (polity2)	Polity IV	167	1800-2018
Voice and accountability	WB WGI	212	1996–2023
Regulatory quality	WB WGI	212	1996–2023
Government effectiveness	WB WGI	212	1996–2023
Political stability	WB WGI	212	1996–2023
Economic freedom index	The Heritage Foundation	187	1995–2024
Electoral democracy index	V-Dem	202	1789–2024

Contribution de la thèse

Le **Chapitre 1**⁴ présente tout d'abord une revue de la littérature consacrée à la relation entre corruption et recettes fiscales. À partir des années 1990, avec la création de bases de données permettant de mesurer la corruption et la qualité institutionnelle à grande échelle, un corpus important de recherches s'est attaché à analyser l'impact de la corruption sur la mobilisation des recettes fiscales. Ainsi, si l'étude pionnière de Tanzi and Davoodi (1997) a abordé cette question dans un cadre plus large en se concentrant principalement sur les

⁴Une version abrégée du Chapitre 1 a été publiée dans Economics Bulletin (Meddeb, Harbaoui, and Bouabid 2025)

investissements et la croissance, Ghura (1998) est généralement considéré comme le premier à avoir évalué empiriquement l'effet de la corruption sur la mobilisation fiscale, en utilisant des données relatives à l'Afrique subsaharienne. Depuis, un nombre considérable de travaux empiriques ont mis en évidence l'existence d'une relation négative entre la corruption et les recettes fiscales. En effet, la corruption tend à réduire les recettes de l'État lorsqu'elle encourage l'évasion fiscale, favorise l'octroi indu d'exemptions ou engendre une administration inefficace de l'impôt (Alm, Bahl, and Murray 1991; Tanzi 1998; Gupta, Hamid Davoodi, and Tiongson 2001; Sen Gupta 2007; Thornton 2008; Attila, Chambas, and Combes 2009; Phuong 2015; Baum et al. 2017; Epaphra and Massawe 2017).

Toutefois, quelques études ont également exploré la possibilité de relations non linéaires entre corruption et fiscalité (Méon and Sekkat 2005; Méon and Weill 2010; Bogetić and Naeher 2024a). Ces travaux suggèrent que, dans certains contextes, la corruption peut contribuer à réduire l'évasion fiscale et, par conséquent, à accroître les recettes publiques. Ce mécanisme s'explique par le fait que, lorsque les gains attendus de la corruption tels que les pots-de-vin sont élevés, les agents chargés du recouvrement de l'impôt sont davantage incités à exercer une surveillance accrue des contribuables. Cette intensification du contrôle augmente le coût perçu de la fraude, ce qui dissuade les contribuables de s'y engager et entraîne une hausse des recettes fiscales (Mookherjee 1997; Chand and Moene 1999). Néanmoins, Fjeldstad and Tungodden (2003) soulignent que cet effet demeure probablement transitoire et tend à s'estomper à long terme. Plus généralement, si la corruption produit des effets largement négatifs dans les pays dotés d'institutions solides, elle peut, dans des environnements fortement réglementés et caractérisés par une gouvernance publique inefficace, jouer temporairement un rôle de « lubrifiant » économique en stimulant la productivité et l'esprit entrepreneurial. L'ensemble de ces travaux montre que la corruption peut avoir à la fois des effets positifs et négatifs sur la fiscalité, révélant ainsi le caractère ambigu de cette relation et confirmant sa nature non linéaire. Cela soulève néanmoins la question du seuil de corruption tolérable avant

qu'elle ne devienne véritablement nuisible au système fiscal. Cette problématique demeure d'actualité, puisque la littérature existante n'a pas encore déterminé s'il existe un niveau précis de corruption susceptible de renforcer, ou au contraire, de fragiliser la fiscalité. De plus, aucune étude n'a identifié de manière exhaustive le degré de corruption qui permettrait d'optimiser les recettes fiscales.

Par ailleurs, la majorité de ces recherches repose sur des mesures agrégées de la corruption, sans distinguer les effets spécifiques de ses différentes composantes dans un cadre non linéaire. En particulier, les travaux antérieurs sur la relation entre corruption et recettes fiscales se sont largement appuyés sur des indicateurs composites, tels que les indices ICRG (International Country Risk Guide) et/ou proposés par la Banque mondiale WGI (World Governance Indicators), pour évaluer la corruption.

Dans cette perspective, le chapitre 1 vise à combler cette lacune de la littérature. Sa principale contribution réside dans la modélisation de l'impact de la corruption politique et de ses différentes composantes, à partir de la base de données V-Dem, sur les recettes fiscales des pays en développement, tout en tenant compte de la non-linéarité de la relation. La base V-Dem fournit en effet des indicateurs détaillés couvrant diverses formes de corruption: politique, exécutive, judiciaire, administrative et au sein du secteur public permettant ainsi une analyse plus fine et nuancée de ce phénomène, plutôt que de le traiter comme un concept uniforme. En utilisant les indicateurs désagrégés de la corruption issus de la base V-Dem et en appliquant une approche MMG dynamique pour traiter l'endogénéité de la corruption, le chapitre examine également les déterminants macroéconomiques de la mobilisation des recettes fiscales dans les pays en développement. Les résultats montrent que la corruption entretient une relation non linéaire avec les recettes fiscales, relation influencée à la fois par son ampleur et sa nature.

Le **Chapitre 2** s'attache à analyser la relation entre la qualité institutionnelle et les recettes fiscales en introduisant un canal de transmission encore peu exploré dans la littérature : les investissements directs étrangers (IDE). La revue de la littérature met en évidence trois

grands axes de recherche. Premièrement, de nombreuses études ont examiné l'effet de la qualité institutionnelle sur la mobilisation fiscale. Ces travaux montrent que des institutions solides renforcent la capacité de l'État à collecter l'impôt en améliorant l'efficacité administrative, la transparence et la conformité fiscale. Des recherches telles que (Méndez and Sepúlveda 2006; R. M. Bird, Martinez-Vazquez, and Torgler 2008; Ajaz and Ahmad 2010; Besley and Persson 2014; Phuong 2015; Hussain, Ilahi, et al. 2016; Arif and Rawat 2018) soulignent le rôle positif des institutions dans l'augmentation des recettes publiques, bien que certains résultats restent contrastés en fonction des contextes économiques et politiques.

Deuxièmement, la littérature portant sur l'impact de la qualité institutionnelle sur les IDE met en évidence que la stabilité politique, la sécurité des droits de propriété, la prévisibilité réglementaire et le contrôle de la corruption sont des facteurs déterminants de l'attractivité des IDE. Des études empiriques confirment qu'un environnement institutionnel sain favorise l'investissement étranger et, par conséquent, la croissance économique (Bénassy-Quéré, Coupet, and Mayer 2007; Buchanan, Le, and Rishi 2012; Staats and Biglaiser 2012; Saidi, Ochi, and Ghadri 2013). À l'inverse, la faiblesse institutionnelle et la corruption accroissent les risques pour les investisseurs, réduisant ainsi les flux d'IDE. Troisièmement, les recherches sur la relation entre IDE et recettes fiscales présentent des conclusions divergentes. Certains auteurs montrent que l'IDE peut élargir la base imposable en stimulant la production, les échanges et la consommation (Mahmood and Chaudhary 2013; Aslam 2015; Odabaş 2016), tandis que d'autres soulignent qu'il peut réduire les recettes fiscales à cause d'incitations fiscales excessives, de stratégies d'optimisation (prix de transfert, clauses de stabilisation) et d'une faible capacité administrative, notamment dans les pays à faible revenu (Tanzi and H. R. Davoodi 2000; Zee, Stotsky, and Ley 2002; Attila, Chambas, and Combes 2009; Okey 2013; Jeza, Hassen, and Ramakrishna 2016; Bayar and Ozturk 2018).

À notre connaissance, aucune étude n'a examiné de manière explicite le rôle des IDE comme canal de transmission reliant la qualité institutionnelle à la performance fiscale. Ce

chapitre comble cette lacune en mobilisant une approche de médiation fondée sur les modèles d'équations structurelles (SEM) développée par Baron and Kenny (1986), complétée par des estimations alternatives (SUR et GMM). Les résultats empiriques montrent que la qualité institutionnelle exerce un effet direct positif et significatif sur les recettes fiscales, confirmant que des institutions solides améliorent la capacité de l'État à mobiliser les ressources publiques. En revanche, l'effet indirect via les IDE demeure plus limité, en particulier dans les pays à faible revenu, où la combinaison d'incitations fiscales excessives, de forte informalité et de faible capacité administrative réduit les retombées fiscales des investissements étrangers. Ces effets deviennent toutefois plus marqués dans les pays à revenu intermédiaire et élevé, où la gouvernance, la stabilité réglementaire et l'efficacité de l'administration fiscale permettent de mieux canaliser les IDE vers l'élargissement de la base imposable.

Après avoir mis en évidence, dans les deux premiers chapitres, le rôle de la corruption et de la qualité institutionnelle dans la mobilisation des recettes fiscales, il est désormais pertinent d'examiner l'effet des instruments fiscaux eux-mêmes sur la performance économique. Le **Chapitre 3** s'inscrit dans cette perspective et constitue, à notre connaissance, la première étude consacrée à l'évaluation de l'impact de l'introduction de la taxe sur la valeur ajoutée (TVA) sur l'efficacité économique en Tunisie. Ce chapitre s'appuie sur la théorie de l'efficacité productive de P. A. Diamond and Mirrlees (1971), selon laquelle un système fiscal optimal ne doit pas influencer les décisions de production des entreprises. En pratique, la validité de ce théorème dépend de conditions institutionnelles et administratives rarement réunies dans les pays en développement, notamment en raison de l'importance du secteur informel, de la faiblesse du contrôle fiscal et de la multiplicité des exemptions. La réforme de 1988, qui a substitué la TVA à l'ancien impôt sur le chiffre d'affaires, constitue donc un cadre empirique pertinent pour évaluer la capacité d'un pays émergent à tirer parti des gains d'efficacité associés à cette taxe.

Alors que la littérature empirique portant sur les économies en développement demeure limitée et se concentre principalement sur le rendement budgétaire de la TVA ou sa contribution

au PIB (Unegbu and Irefin 2011; Njogu 2015; Sayari, Jassem, Sahar, et al. 2023), ce chapitre adopte une approche novatrice en mobilisant la méthode du contrôle synthétique (Abadie and Gardeazabal 2003; Abadie, A. Diamond, and Hainmueller 2010; Abadie, A. Diamond, and Hainmueller 2015), rarement utilisée dans le domaine de la fiscalité. À notre connaissance, Adhikari (2020) constitue la seule étude ayant appliqué cette méthode pour analyser l'effet de l'adoption de la TVA sur l'efficacité économique, et ce, dans un cadre d'analyse multi-pays. Le présent chapitre étend cette approche à une étude de cas unique, celle de la Tunisie, afin de construire un contrefactuel crédible représentant l'évolution de la productivité en l'absence de réforme. L'application du contrôle synthétique à ce cas national permet de dépasser les limites des approches traditionnelles et des modèles de différences-en-différences, en combinant de manière pondérée des pays comparables n'ayant pas introduit la TVA à la même période. Cette approche offre une évaluation transparente et robuste de l'effet causal de la réforme de 1988 sur la productivité du travail et sur ses principaux canaux de transmission, à savoir la productivité totale des facteurs et le capital par travailleur. Les résultats montrent que l'introduction de la TVA a eu un effet positif et économiquement significatif à court terme sur l'efficacité économique, avant de s'atténuer progressivement au cours des années suivantes. Cette dynamique souligne le rôle déterminant des conditions institutionnelles, de la qualité de la gouvernance et de la capacité administrative dans la durabilité des gains d'efficacité associés à la mise en œuvre de la TVA.

Chapter 1

Corruption and Tax Revenue Mobilization in Developing Countries: Evidence from a Disaggregated and Nonlinear Analysis

Over the past two decades, increasing attention has been given to the mobilization of tax revenues in developing countries. Numerous empirical studies have investigated the impact of economic, structural, institutional, and social factors on public revenues, with a strong focus on corruption. This chapter contributes to the literature by distinguishing between various types of corruption and examining their nonlinear relationships with tax revenue. By utilizing disaggregated V-Dem indicators for corruption, and applying a dynamic GMM approach to address the endogeneity of corruption, the chapter also examines macroeconomic determinants of tax revenue mobilization in 122 middle- and low-income countries from 1990 to 2017. The findings demonstrate that corruption has a nonlinear relationship, shaped by both its scale and nature.

Keywords: Disaggregated corruption, tax revenue mobilization, GMM, developing countries, nonlinearity .

JEL: E6, H0, H2, H3

1.1 Introduction

Over the past decade, policymakers and researchers have paid increasing attention to issues related to domestic revenue mobilization. With the adverse effects of external shocks such as the last financial crisis in 2008 and the consequences of the COVID-19 pandemic health crisis on public finances, this issue is becoming more acute in developing countries. Indeed, domestic resources represent the primary public source of development financing in these countries. There is currently some international consensus that governments in low-income countries should tax more to increase the proportion of GDP they raise through taxes. The Addis Ababa Action Agenda (2015) and the 2030 Agenda for sustainable development has identified domestic resources as the main sources of funding, stable and sustainable, for development.¹ Tax revenue mobilization is increasingly a major challenge for these countries, especially in a context where the public finances of major ODA² donors are under pressure due to the consequences of the recent health crisis. Effective domestic revenue mobilization is important for economic and social development by enabling governments to finance essential public goods needed to achieve the sustainable development agenda. Numerous empirical studies have been conducted to investigate the impact of economic, structural, institutional and social factors on tax revenues. Studies on the role of corruption have been a major focus.³

Many studies have shown that systemic corruption undermines the capacity of the state to deliver inclusive growth and reduce poverty. It undermines the core of business and restricts the economic potential of countries. It erodes public trust in the state and institutions, reduces the efficiency and equity of public policies and diverts taxpayers' money away from social spending (Monitor 2019). Corruption leads to a loss of tax revenue. It allows some people to evade taxes, while others often end up paying more. The loss of revenue can also hamper the state's ability to carry out social spending. In addition,

¹There is currently some international consensus that governments in low-income countries should ensure that they tax more to increase the proportion of GDP they raise through taxes. A proposal that governments should have a duty to raise tax revenues to at least 20 per cent of GDP was formally rejected at the Third International Conference on Financing for Development in Addis Ababa (2015). But the concept that there should be a set minimum level of national tax revenue is still valid. The value of 15 per cent of GDP is now widely cited.

²Official development assistance (ODA) is defined as government aid that promotes and specifically targets the economic development and welfare of developing countries.

³Corruption is described as "the abuse of public office for private gain". Transparency International and international organizations (IMF, World Bank, OECD, etc.) use this definition.

the quality of public services and infrastructure is reduced when government decisions are driven by bribes or nepotism. Moreover, corruption erodes trust in the state and can lead to social and political instability (Monitor 2019). Corruption affects all aspects of public financial management. Revenue and tax collection, the budgetary process, public expenditure and procurement, accounting, auditing and controls are all at risk. Depending on its extent, corruption can have a very detrimental effect on public finances, as authorities receive less tax revenue and overpay for certain goods and services or investment projects, but the cost is greater than the sum of these losses: by distorting spending priorities, it limits the state's ability to work towards sustainable and inclusive growth. Public funds are diverted from education, health and infrastructure quality investments that could improve economic performance and raise the standard of living of the entire population. The extent of corruption in an economy can affect both the level and composition of tax revenues (Ghura 1998; Tanzi and H. R. Davoodi 2000). Corruption in the evaluation and collection of taxes tends to be a more serious problem where the tax base is more difficult to observe (e.g., certain types of income and profits), or where taxpayers can negotiate tax payments with tax administrators who have excessive power of decision in assessing the amount of tax due (e.g. in the case of property taxes). Other factors that tend to encourage tax corruption include complicated tax laws and the need for frequent contact between tax collectors and taxpayers (Tanzi 1998). As the types of taxes differ in these factors, they tend to be affected differently by a given level of corruption. Tanzi and H. R. Davoodi (2000) found that corruption had a more negative effect on direct taxes than on indirect taxes in a sample of developing countries. In addition, as corrupt tax collectors push some businesses into the informal sector and investment and growth are affected by corruption, tax revenues from small business profits and taxes on goods and services tend to decline. Corruption has more than just financial costs. It reduces public trust and the willingness of citizens to participate in society. For example, citizens who perceive politicians as corrupt may not care to vote in elections, engage in politics or pay taxes. The fiscal costs of corruption can be considerable for all countries, regardless of their level of development.⁴ Revenue administration is very important to the development and economic health of

⁴As Monitor (2019) has shown that when countries with similar income levels are compared, the tax revenue to GDP ratio of the least corrupt is 4 percentage points higher than that of the most corrupt. In light of these comparisons, if all countries today reduced corruption by a similar amount, on average, as they have over the past 20 years, global tax revenues would increase by 1 trillion dollars (or 1 ¼ % of global GDP), or more, as lower corruption would accelerate economic growth, which would further increase revenues.

a state, as it significantly affects its ability to spend on public projects and programs, making problems of inefficiency and revenue leakage particularly damaging. Tax administration is an attractive area for corruption, as there are many opportunities and incentives to engage in illicit activities. The complexity of tax laws, the high discretionary powers of tax officials, the low cost of sanctions are only some of the factors creating opportunities for corruption in tax administration. Corruption not only reduces the tax/GDP ratio, but also causes long-term damage to the economy by reducing investment, increasing the size of the informal economy, distorting tax structures and corroding the tax morale of taxpayers. All these factors in turn further reduce the long-term revenue generating potential of the economy. This chapter aims to provide additional econometric evidence on the effects of corruption on the structure of taxation in developing countries. In particular, it aims to assess the effect of different sub-indicators of corruption on different categories of government revenue. Indeed, the positions of individuals in government determine the type of corruption; executive, legislative, judicial or administrative. Usually, most empirical studies use the three measures of corruption of Transparency International, the World Bank and the ICRG index. All empirical studies found in the economic literature on the link between corruption and the tax structure rely on a composite index of corruption rather than on specific measures of corruption. In this study, we use a corruption index from the Varieties of Democracies (V-Dem) database. On the one hand, this index is a composite index of the three indices commonly used in the economic literature on corruption. On the other hand, it breaks down the aggregate indicator of political corruption into sub-indicators of executive, legislative, administrative and judicial corruption. It is therefore Disaggregate the concept of corruption by studying the impact of different types of corruption (executive, legislative, administrative and judicial) on the mobilization of different categories of tax revenue in developing countries. This study adds to the previous literature on the relationship between corruption and tax revenue mobilization in developing countries by investigating the impact of different categories of corruption on the tax structure in developing countries. Our sample is larger in size and more diverse in composition than those used in previous studies. In addition, the number of periods for each country is quite long in most countries. The present study is in line with this literature. It aims to extend the existing empirical literature on the impact of tax revenue mobilization by distinguishing between different types of corruption. Using a disaggregated corruption indicator that

decomposes political corruption into corruption sub-indices; executive, legislative, administrative and judicial, and a dynamic GMM approach to address concerns about the endogeneity of corruption, the chapter analyses various determinants of public revenue mobilization in 122 middle and low-income countries for the period 1990-2017. In the second part, this study also demonstrates the existence of a nonlinear relationship between corruption and tax revenue. The rest of the chapter is structured as follows. In the second section, we review the theoretical literature on the effect of corruption on public finances and, more specifically, on the structure of state revenues. The third section will review the existing empirical literature on the impact of corruption on tax revenue mobilization. The fourth section will be devoted to a presentation and descriptive analysis of the data and econometric modeling. The results and their interpretations are presented in a fifth section. A sixth section to check robustness of our estimation results. Finally, the seventh section will be reserved for the conclusion and recommendations.

1.2 Theoretical foundations of the relationship between corruption and public revenue

From a theoretical perspective, the link between corruption and tax revenue mobilization falls within the broader debate on corruption's economic effects. The literature advances two main views: the "greasing the wheels" hypothesis and the "sanding the wheels" hypothesis.

Theoretical analyses in public finance and political economy generally concur that corruption undermines tax capacity. Rather than a neutral friction, corruption produces a diversion of tax receipts within the collection process, lowering the effective yield of taxation and weakening neutrality and fairness (Shleifer and Vishny 1993; Rose-Ackerman 2013; Rose-Ackerman and Palifka 2016). In the principal-agent perspective, informational asymmetries and discretion enable tax officials to exchange leniency or non-enforcement for bribes; unless incentives and monitoring are designed to deter side payments, enforcement is effectively "sold," reducing revenue and administrative efficiency (Klitgaard 1988; Mookherjee and Png 1995). In tax-compliance models, when audits and penalties become negotiable, the expected cost of evasion falls, tax morale erodes, and the tax base contracts (Allingham and Sandmo 1972; Reinganum and Wilde 1985). Corruption also distorts policy design: complex and

opaque tax codes with discretionary exemptions create rents that can be traded for bribes, narrowing the base and biasing the system toward less efficient instruments (Shleifer and Vishny 1993). From the institutional point of view, institutional quality is a fundamental determinant not only of growth but also of fiscal performance. Countries with inclusive, credible, and stable institutions mobilize domestic resources more effectively and rely less on external finance (North 1990; Acemoglu, Johnson, and Robinson 2001; Acemoglu, Johnson, and Robinson 2005). In this light, corruption is a manifestation of institutional weakness that erodes tax capacity by diverting receipts, undermining enforcement, and lowering voluntary compliance. This perspective aligns with the view often termed the “sanding the wheels” hypothesis widely supported in contemporary theory: corruption degrades the functioning of public institutions, distorts economic incentives, and ultimately hinders economic performance, including the state’s ability to raise revenue sustainably (Shleifer and Vishny 1993; Aidt 2003). The effect of corruption on tax revenue has to be qualified, however. Corruption sometimes does not involve taxpayers and may not always affect tax revenue directly. For example, when tax auditor positions in a revenue administration are “sold” instead of being filled through proper selection process, the taxpayer is not directly involved. Similarly, if a taxpayer bribes a revenue administration employee to expedite processing of a tax refund, this does not necessarily entail a loss of tax revenue (except in present value terms).

On the other hand, other economists see corruption as a way to “grease the wheels” of the economy. Early theoretical contributions on the corruption–growth nexus emphasized potential positive effects of corruption on economic activity and offered frameworks to analyze this impact. In the 1960s, Leff (1964), Leys (1965), and Huntington (1968) argued that corruption might, in certain contexts, enhance efficiency through two main channels: bribes enable firms to bypass bureaucratic delays, and the prospect of rents induces bureaucrats to exert greater effort. Building on this logic, Lui (1985) developed an equilibrium queuing model of bribery showing that bureaucratic corruption can “select” more efficient firms by awarding contracts to those willing (and able) to pay higher bribes. Consistent with this view, Beck and Maher (1986) compared an equilibrium bribery model with a competitive bidding model and concluded that, because only the most efficient companies can finance the largest bribes, corruption may “grease the wheels” by allocating investment more efficiently. Acemoglu and

Verdier (1998) demonstrated theoretically that if the costs of combating corruption are sufficiently high, the output-maximizing level of corruption may be strictly positive.

Nevertheless, recent research, although supporting the greasing the wheels hypothesis, has underlined its limits. Indeed, bureaucratic corruption's supposed ability to speed up procedures is limited: firms that pay the largest bribes often end up spending more time negotiating regulations (Kaufmann and Wei 1999). This reflects distorted incentives on the part of officials, who may deliberately slow processes and engineer administrative delays to extract additional payments (Bardhan 2006; Myrdal 2024). Only a few theoretical studies have specifically examined fiscal corruption or the effect of corruption on taxation. These studies suggest that corruption can, under certain conditions, reduce tax evasion and thereby raise tax revenue. When the expected gains from bribery are high, tax collectors have stronger incentives to monitor taxpayers closely, which increases the perceived cost of evasion and can temporarily boost receipts (Mookherjee 1997; Chand and Moene 1999). However, Fjeldstad and Tungodden (2003) argues that these effects are short-lived and fade over time. More broadly, while corruption is usually harmful where institutions work well, it can in highly regulated places with weak governance, briefly boost productivity and entrepreneurship. Even so, any short-term offset to excessive regulation does not make corruption a reliable engine of growth (Dreher and Gassebner 2013).

However, without empirical validation, it is difficult to know which of the two approaches better describes economic reality. We thus examine the theoretical implications using the data.

1.3 Review of the empirical literature

Over the past two decades, an extensive body of empirical research has examined the relationship between corruption and tax revenue mobilization, particularly in developing countries. While most studies agree that corruption undermines fiscal performance, they differ in their assessment of how, to what extent, and under what institutional conditions this occurs. The following review organizes the main findings into three analytical dimensions: the general adverse effects of corruption on fiscal capacity, the emerging literature that disaggregates tax structures into direct and indirect taxes, evidence of nonlinear corruption-tax revenue and institutional structure disaggregation.

A large body of empirical work has documented the detrimental impact of corruption on public revenue. Corruption, understood as the abuse of public office for private gain, reduces governments' ability to collect taxes by encouraging tax evasion, promoting improper exemptions, and weakening administrative enforcement (Alm, Bahl, and Murray 1991; Tanzi 1998; Gupta, Hamid Davoodi, and Tiongson 2001; Thornton 2008; Attila, Chambas, and Combes 2009; Phuong 2015; Baum et al. 2017; Epaphra and Massawe 2017). Using broader samples, Sen Gupta (2007) and R. M. Bird, Martinez-Vazquez, and Torgler (2008) confirmed that high corruption levels are systematically associated with weaker fiscal capacity. Similarly, Besley and Persson (2014) and Phuong (2015) emphasized that weak institutional environments marked by low accountability and poor regulatory quality exacerbate the fiscal costs of corruption by eroding compliance and administrative efficiency.

Early studies such as Ghura (1998) and Tanzi and H. R. Davoodi (2000) established that corruption significantly lowers the tax-to-GDP ratio, especially for direct taxes that depend heavily on discretionary assessments. While, other empirical analyses by Hwang et al. (2002), Thornton (2008), Patrick A Imam and Jacobs (2007), and Attila, Chambas, and Combes (2009) show that corruption has a stronger negative effect on indirect taxes (such as VAT and excise duties) than on direct taxes, owing to the greater frequency of taxpayer–official interactions.

Together, these studies establish a strong empirical consensus: corruption acts as a fiscal constraint, both directly by facilitating evasion and rent-seeking and indirectly by weakening trust in public institutions and distorting fiscal governance. However, this line of research relies heavily on negative effect of corruption on public tax revenue.

A second strand of the literature highlights that the corruption-tax revenue relationship may not be uniformly negative. Some theoretical and empirical studies suggest that the impact of corruption depends on its intensity and the quality of institutions. For instance, Mookherjee (1997), Chand and Moene (1999), and Fjeldstad and Tungodden (2003) show that, under specific conditions, corruption may temporarily reduce tax evasion and thus increase revenues. When the expected gains from corruption (e.g., bribes) are high, tax collectors may intensify monitoring, raising the perceived cost of evasion and temporarily boosting fiscal yield. Yet, this mechanism is typically short-lived, as corruption eventually undermines enforcement credibility and institutional trust. Building on this perspective, Méon and

Sekkat (2005), Méon and Weill (2010), and Houston (2007) formalize the “grease vs. sand” debate. They find that in highly regulated economies with inefficient bureaucracies, limited corruption may help firms bypass administrative rigidities “greasing the wheels.” However, beyond a threshold, corruption turns destructive, “sanding the wheels,” by fostering rent-seeking and eroding fiscal discipline. Dreher and Gassebner (2013) similarly concludes that while corruption may ease overregulation in the short term, it is not a sustainable driver of growth or fiscal performance. Recent works, including Bogetić and Naeher (2024a) and Bogetić and Naeher (2024b), extend this analysis by showing that the “grease the wheels” effect may persist only in near-failed states with extremely weak governance, but disappears or reverses at intermediate institutional levels. These findings reinforce the need to model nonlinearities and threshold effects when examining corruption’s fiscal consequences. In sum, this body of research underscores that the relationship between corruption and taxation is ambiguous and context-dependent: its direction and intensity hinge on institutional quality and the degree of bureaucratic inefficiency. Yet an important gap remains: the potential nonlinearity of this relationship shaped by both the nature and the intensity of corruption is still insufficiently analyzed.

At the institutional level, research by Guillamón et al. (2021) and Liu and Mikesell (2019) reveal that political and administrative corruption fosters fiscal opacity, obscures the true tax burden, and reduces transparency. Cross-country work by Arif and Rawat (2018) and Phuong (2015) demonstrates that improved governance, particularly judicial effectiveness and anti-corruption reforms, significantly enhances tax revenue, especially in emerging and middle-income economies.

Despite these advances, most studies still rely on aggregate corruption measures, masking differences between executive, legislative, judicial, and administrative corruption. This limitation prevents a clear understanding of which institutional channels drive fiscal performance.

The above studies are informative but incomplete. In what follows, we propose an original empirical strategy to analyze the link between corruption and tax revenue. Specifically, we (i) identify threshold effects in the corruption–revenue relationship and (ii) document the co-existence of the greasing the wheels and sanding the wheels hypotheses as a function of both the nature (type) and the scale (intensity) of corruption. While prior work has uncovered nonlinearities along other dimensions, notably via interactions with institutional quality, it has typically relied on aggregate corruption indices (e.g.,

WGI, ICRG). By contrast, we leverage recent V-Dem corruption indicators to disaggregate corruption into its constituent forms and to test directly for type specific, intensity dependent nonlinearities in tax revenue mobilization.

1.4 Data and descriptive analysis

This study covers a sample of 122 low and middle-income countries over the period 1990-2017. The choice of this period is linked to the availability of data for this period for these countries, and in particular the tax revenue variables. The data for the dependent variables, total tax revenue, direct and indirect taxes, come from the Government Revenue Dataset (GRD) of the International Central for Tax and Development (ICTD). This database combines data from several international sources⁵ to compile a comprehensive database of government revenues and tax trends over time with global coverage for 186 countries. The most recent version published in September 2019 is used.⁶ For our variable of interest on corruption, data are collected from the V-Dem (Varieties of Democracy) database. Variety of Democracy (V-Dem) is a new approach to the conceptualization and measurement of democracy. V-Dem provides a multidimensional and disaggregated dataset that reflects the complexity of the concept of democracy as a system of law that goes beyond the mere holding of elections. As of 2019, the dataset covers 202 countries between 1789 and 2018. The directionality of the V-Dem Corruption Index ranges from 'less corrupt' to 'more corrupt' (in contrast to the other V-Dem variables which generally range from 'less democratic' to 'more democratic'). The corruption index includes measures of six distinct types of corruption that cover both different areas and levels of the political sphere, distinguishing between executive, legislative⁷ administrative, judicial and regime corruption. In the executive sphere, the measures also distinguish between corruption primarily related to bribes and corruption related

⁵National government statistics agencies, World Bank, IMF, Academic and research institutions, National tax authorities and revenue departments and Surveys and data collections from countries and regions

⁶We preferred to use this database over the International Monetary Fund (IMF) and OECD longitudinal world income database because it covers more countries. The IMF database covers 147 advanced and developing countries as of 1995. There are methodological and source differences between the ICTD and World Bank data, which makes it a strong candidate for robustness checks.

⁷As data on legislative corruption are missing for countries without legislatures, the authors of the database take the average of public sector corruption, executive corruption and judicial corruption to create the legislative corruption index (McMann et al., 2016).

to embezzlement. They also distinguish between corruption at the highest levels of the executive branch (at the level of leaders/government) on the one hand, and corruption in the general public sector on the other. The measures thus capture several types of corruption: 'petty' and 'grand' corruption; bribery and theft; corruption aimed at influencing the legislative process; and corruption related to implementation. Aggregation: The index is obtained by taking the average of (a) the public sector corruption indicator, (b) the executive corruption indicator, (c) the legislative corruption indicator, and (d) the judicial corruption indicator. In other words, these four spheres of government are equally weighted in the index produced. Scores are given on a continuous scale from 0 (lowest level of corruption) to 1 (highest level of corruption). Building on the economic literature on the determinants of tax revenue mobilization (Khattry and Rao 2002; Baunsgaard and M. Keen 2010; M. Keen and Lockwood 2010; Baum et al. 2017), we include the following control variables. Real GDP per capita is a proxy for overall development, with a higher level of income per capita generally positively related to domestic tax revenues. Other things being equal, a higher level of per capita income is likely to lead to higher revenues from all taxes (Sen Gupta 2007). Sen Gupta (2007) identifies agricultural value added as one of the key conventional explanatory variables. Empirical evidence indicates that this sector is difficult to tax because of the large share of subsistence agriculture, which helps explain the low tax-to-GDP ratios observed in many developing countries. The degree of openness, measured by the ratio of exports plus imports to GDP, is intended to capture the effects of international trade on government revenue. It is often viewed as a source of higher revenues, particularly in developing economies, because exports and imports are recorded at designated entry and exit points, which reduces opportunities to avoid taxation (Sen Gupta 2007; Baunsgaard and M. Keen 2010). Indeed, open economies tend to raise more taxes, as economies with large international trade sectors are usually better organized and more monetized, which reduces the costs of tax administration. There is, however, one exception: taxes on international trade are generally lower in open economies, as governments seek to minimize such taxes in order to stimulate trade (Rodriguez and Rodrik 2000). In an inflationary context, Tanzi (1992) argues that when real tax payments lag behind the underlying taxable transactions, tax liabilities are lower in real terms at the time of payment. Likewise, excise taxes on products such as tobacco, alcohol, and gasoline may be set at specific rates that are not automatically adjusted for inflation. Higher inflation is expected

to reduce domestic tax yields according to the Tanzi-Olivera effect ⁸. Ghura (1998) also contends that high inflation can shrink the tax base, as individuals protect their wealth by shifting into assets such as livestock that are less likely to be taxed or by postponing investment plans. Overall, the tax revenue shortfall may decline with inflation; however, despite a substantial literature on the impact of inflation on revenue performance, the phenomenon is difficult to characterize precisely. If governments rarely index higher tax brackets to inflation, personal income tax receipts and social contributions tend to rise in step with wage growth, implying that inflation pushes more taxpayers into higher brackets (“bracket creep”). Moreover, provided that inflation is sufficiently low and not too volatile, corporate profits may rise alongside overall price increases, suggesting that corporate income tax receipts can also increase with inflation. Following Tanzi (1983), higher urbanization raises per-capita demand for public goods and services and shifts activity toward formal, monetized markets, expanding taxable bases and lowering collection costs, omitting urbanization would therefore bias estimates of corruption’s effect on revenue. Urbanization in emerging economies is linked to broader VAT and excise bases and to stronger administrative capacity, which improves enforcement and compliance; we include urbanization as a control to capture these fiscal capacity differences when estimating the corruption–revenue relationship (Tanzi and Zee 2000) . Increased taxes can be also a consequence of increased government expenditures for some economists, while others find that excessive spending can lead to inefficiencies and reduced revenue collection (Ozun, Ertuğrul, and Haliscelik 2024). All these data come from the World Bank’s Development Indicators database. See Annex 1, Table 1.10, for their definitions and sources. Descriptive statistics are presented in Table 1.1.

In order to assess the extent to which political corruption affects tax mobilization in developing countries, we propose to conduct a graphical analysis of the relationship between these two variables in developing countries. Figure 1.1 present scatter plots linking the average of the total tax revenue/GDP ratio and the average of the political corruption index in the whole sample that will be used in our baseline regression, as well as the linear regression line. We find that the slope of the correlation line showing the relationship between political corruption and tax revenues is negative, indicating that

⁸The Tanzi effect is an economic situation involving a period of high inflation in a country which results in a decline in the volume of tax collection and a deterioration of real tax proceeds being collected by the government of that country.

Table 1.1: Descriptive statistics

	Obs	Mean	Std. dev.	Min	Max
Total tax revenue	2436	16.434	8.524	0.298	56.916
Direct taxes	2566	4.455	2.980	0.018	24.136
Indirect taxes	2806	9.714	4.819	0.152	45.403
GDP per capita	3188	4.038	7.439	-64.047	149.973
Agriculture	3098	18.670	12.649	0.892	79.042
Trade	3199	58.413	30.758	4.101	243.048
Inflation	2857	41.892	511.061	-18.108	23773.13
Urbanization	3378	45.650	19.851	5.416	91.749
Government Expenditures	2840	33.600	68.080	2.147	1311.695
Political Corruption	3373	6.729	2.120	0.88	9.74
Judicial corruption	3384	6.201	1.793	0.643	10
Executive corruption	3373	6.441	2.215	0.43	9.68
Administrative corruption	3373	6.484	2.201	0.46	9.75
Legislative corruption	3384	6.201	1.793	0.643	10
Regime corruption	3373	6.595	2.216	0.33	9.74

increasing corruption in developing countries degrades government tax revenue mobilization. The observation of the scatter plot linking the average government revenue to GDP ratio with the average political corruption index shows a high and statistically significant negative relationship, indicating that political corruption affects revenue mobilization in developing countries.

The graphs also indicate a close relationship between political corruption and its different components (judicial, legislative, administrative, and executive). We added also regime corruption^{9, 10} but also between political corruption and the ratio of government revenue to GDP in developing countries. Thus, the graphical analysis supports the assumption that political corruption has a negative impact on the public revenue mobilization effort in this group of countries. Nevertheless, the conclusions drawn

⁹This index is closely aligned with V-Dem's political corruption index (v2x_corr), but it zeroes in on a more specific group of actors those holding political office and a narrower set of corrupt activities that more directly relate to the conceptualization of corruption in the literature on neopatrimonial governance.

¹⁰V2x_corr: political, v2jucorrd: judicial, v2x_execo: executive, v2x_pubco: public or administrative, v2lgcrpt: legislative, and v2x_np_reg: regime corruption, with values between $[-3, 3]$ where -3 indicates more corruption and 3 indicates less corruption for legislative and judicial corruption, and $[0, 1]$ where 0 indicates less corruption and 1 indicates more corruption for executive, public, and political corruption.

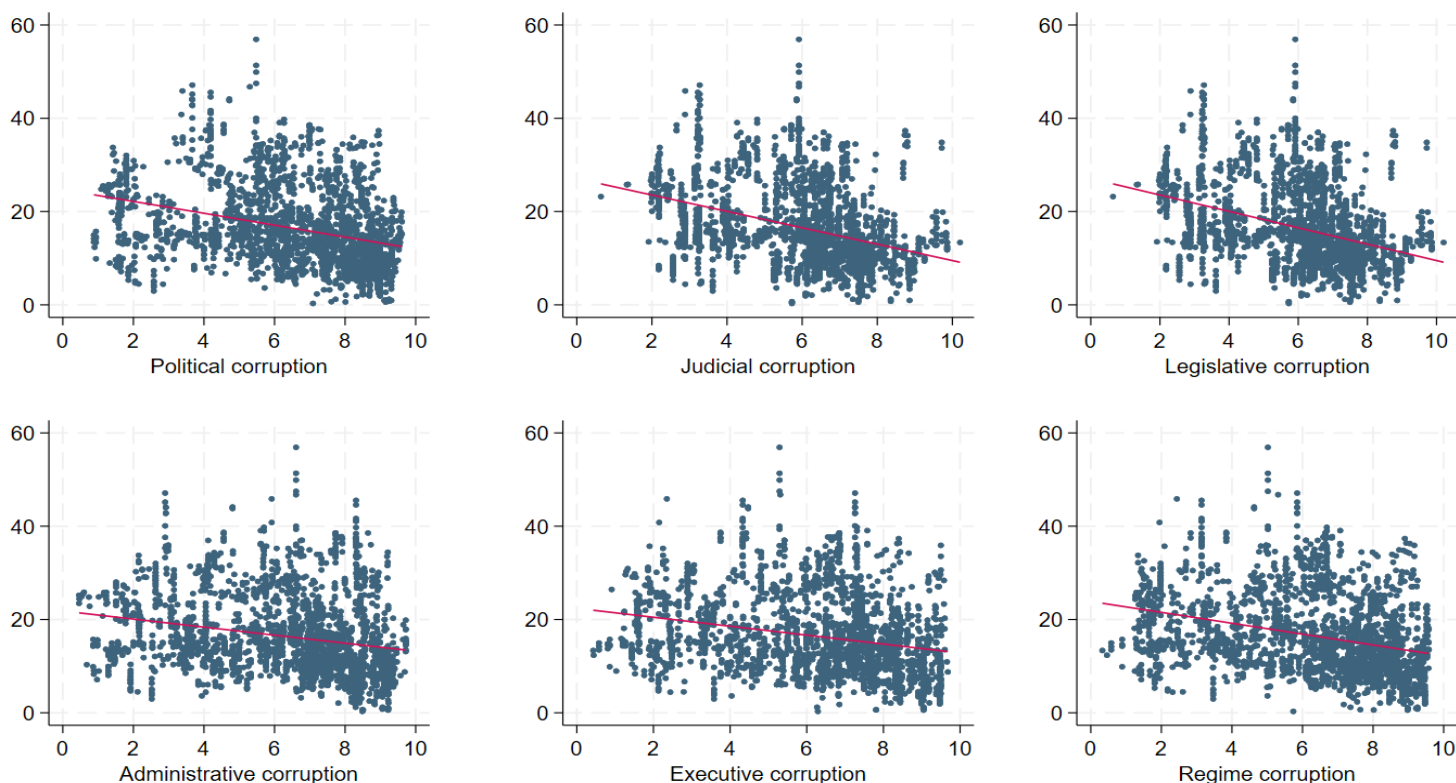


Figure 1.1: Correlation between corruption and the ratio of government revenue to GDP, Source: V-Dem and ITCD

from the descriptive analysis are only presumptive. The analysis of the effect of corruption and its components¹¹ It is therefore important to conduct econometric analysis in order to properly and robustly examine the effect of corruption on the total tax revenue/GDP relationship.

¹¹on public revenue mobilization in developing countries cannot be limited to statistical analysis. In order to facilitate comparisons, all six indices are rescaled to have values between 0 for less corruption and 10 for high corruption.

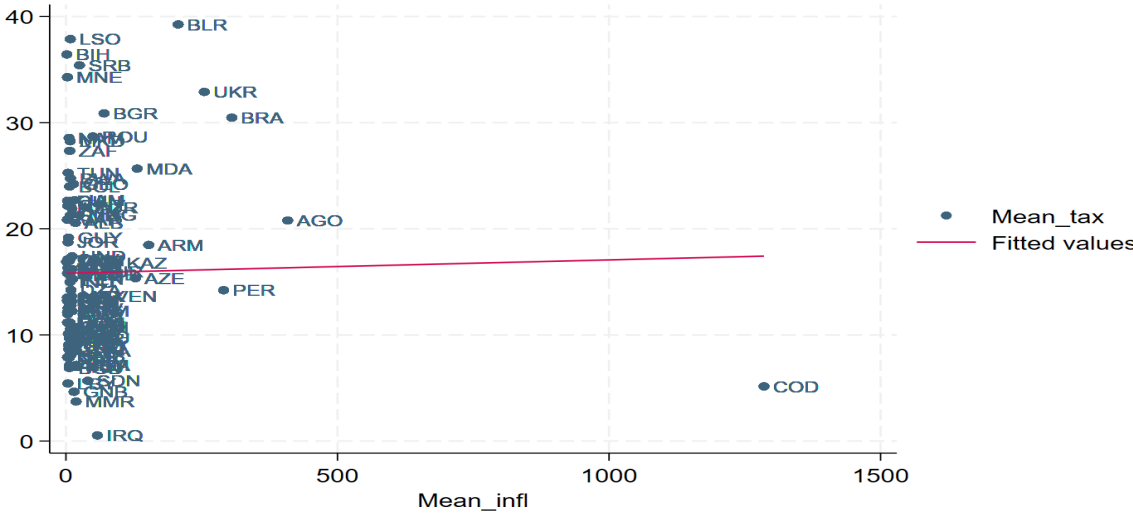


Figure 1.2: Outliers identification in terms of inflation by means calculation

1.5 Model and estimation method

1.5.1 Linear model nexus between corruption and tax revenue

We use the Generalized Method of Moments (GMM) developed for dynamic panel models by Holtz-Eakin et al (1988), Arellano and Bond (1991) and Arellano and Bover (1995). The empirical model used is as follows:

$$TR_{it} = \alpha TR_{i,t-1} + \beta' X_{it} + \delta Corr_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (1.1)$$

where TR_{it} is the ratio of tax revenue excluding subsidies and social contributions to the country's GDP i at time t , X_{it} is a vector of control variables. These elements constitute the determinants: $Corr$ is a measure of corruption that will alternatively take the form of political corruption and then the sub-indices of corruption (executive, legislative, administrative, judicial and regime corruption). α , β and δ are parameters or vectors of parameters to be estimated. η_i , λ_t denote country-specific and time-specific effects. ε_{it} represents the unobserved random error term. Given the persistence of domestic tax revenues, there is a suspicion of serial correlation which is confirmed by a Wooldridge test. To address this, we use an estimator that fits panel regression models when the disturbance term is first order autoregressive. A concern may also arise about the endogeneity of corruption with fiscal performance. It can be argued that the relationship between corruption and tax revenue is unlikely to be unidirectional for two reasons. First, a higher level of taxes may be necessary to invest and build institutions to combat corruption. There is thus a potential reverse causality from taxes to corruption. A key assumption for using panel data techniques is that the data must be stationary. Brooks (2019) notes that non-stationary data can result in spurious regressions. To test for stationarity, the Fisher test, as recommended by Maddala and Wu (1999), is employed. The Dickey-Fuller test assumes that the null hypothesis posits the presence of unit roots in all panels. According to the results in Table 1.2 and 1.3, all variables are stationary because their P-values are below 0.05, leading to the rejection of the null hypothesis.

Estimating equation (1.1) is difficult because of the potential reverse causality between corruption and taxation. High taxation could encourage tax evasion and low tax capacity could encourage corrupt

Table 1.2: Fisher-type unit-root test based on Dickey-Fuller test

Variables	Lags	Chi-squared	P-value
Tax revenue	0	324.475	0.000
Direct taxes	0	400.994	0.000
Indirect taxes	0	471.709	0.000
GDP per capita	0	471.709	0.000
Agriculture	0	528.987	0.000
Trade	0	478.261	0.000
Inflation	0	1557.970	0.000
Urbanization	0	1753.607	0.000
Government expenditures	0	413.244	0.000
Political corruption	0	695.867	0.000
Judicial corruption	0	636.645	0.000
Executive corruption	0	608.291	0.000
Administrative corruption	0	605.383	0.000
Legislative corruption	0	636.645	0.000
Regime corruption	0	736.442	0.000

Table 1.3: Fisher-type unit Root test Based on Phillips-Perron test

Variables	Lags	Chi-squared	P-value
Tax revenue	0	321.336	0.000
Direct taxes	0	397.598	0.000
Indirect taxes	0	397.598	0.000
GDP per capita	0	1984.933	0.000
Agriculture	0	524.831	0.000
Trade	0	472.474	0.000
Inflation	0	1467.814	0.000
Urbanization	0	1705.589	0.000
Government expenditures	0	409.357	0.000
Political corruption	0	684.569	0.000
Judicial corruption	0	635.154	0.000
Executive corruption	0	607.063	0.000
Administrative corruption	0	596.684	0.000
Legislative corruption	0	635.154	0.000
Regime corruption	0	735.466	0.000

behaviour. To address this endogeneity problem, the literature has applied different instrumental variable approaches (Ghura 1998; Hwang et al. 2002; Thornton 2008; Attila, Chambas, and Combes 2009; Baum et al. 2017). In his IV-GLS procedure, Ghura (1998) uses contemporaneous, quadratic and lagged

values of population, population growth and urbanisation rate as instruments. In Hwang et al. (2002)'s study, corruption is instrumented by three variables: the percentage of the population of Protestant faith, a dummy variable for former British colonies and an index of ethnolinguistic fragmentation. Attila, Chambas, and Combes (2009) focus on ethnolinguistic fragmentation, legal origins (French and British), distance from the equator and urbanisation rate as instruments. Thornton (2008) instead uses openness, the black market exchange premium, ethnic fragmentation and a dummy variable for oil producing countries. Baum et al. (2017) add an index capturing religious fragmentation to the ethnolinguistic fragmentation index and religious fragmentation index used by Hwang et al. (2002), Attila, Chambas, and Combes (2009) and Thornton (2008). In this study, we follow Baum et al. (2017) by using the ethnolinguistic fragmentation index and the religious fragmentation index of Alesina et al. (2003) as external instruments for corruption. These are structural, slow-moving country characteristics that measure the probability that two randomly chosen individuals belong to different groups. They are relevant because more fragmented societies tend to face weaker collective action and lower institutional quality, patterns that are empirically linked to higher corruption (Mauro 1995). They are plausibly exogenous to short-run fluctuations in tax revenue: conditional on a rich set of macro-structural and institutional controls (income, inflation, openness, sectoral structure, urbanization, broad governance indicators, and regime type), the remaining effect of fragmentation on revenue should operate mainly through corruption rather than directly.

An additional challenge is the possibility that some omitted variables may be correlated with both corruption and tax revenue mobilization. To mitigate omitted variable bias, the literature has used the fixed effect estimator to control for country-specific factors. However, this technique erases the heterogeneity of the corruption variable and the instrumental variables, which have significant country-specific components. It would have been preferable to account for both endogeneity and fixed effects, but the lack of idiosyncratic heterogeneity of the corruption index led to weak results. To address the above limitations, the results below are estimated using the dynamic Generalized Method of Moments (GMM) estimator based on the Arellano and Bond (1991) methodology. This methodology specifies a dynamic model that allows for time-invariant country-specific effects. In the case of a dynamic panel, it is not appropriate to use the ordinary least squares method as it may give biased estimates due to

the presence of the lagged dependent variable on the right-hand side of the equation. OLS estimates would be inconsistent because the lagged variable $TR_{i,t-1}$ is correlated with the error term (Arellano and Bond 1991; Badi Hani Baltagi and Badi H Baltagi 2008). If the study period is large, the bias becomes small and the problem disappears (Aisen and Veiga 2013). Thus, given the relatively short period of our study, the problem persists. Writing equation (1.1) in first differences removes individual effects and thus eliminates the potential source of this bias. However, when all exogenous variables are expressed as first differences they will become endogenous as the first difference is correlated with the error term. Following Holtz-Eakin, Newey, and Rosen (1988), Arellano and Bond (1991) develop the GMM estimation method for dynamic panel data models which solves the endogeneity problem by instrumenting the lagged endogenous variable with its past values of two or more periods, and the predetermined or weakly exogenous variables (variables that can be influenced by the past values of the dependent variable, but remain uncorrelated with the future realizations of the error term) with their values lagged at least one period. For exogenous variables, their current values are used as instruments. However, this method does not identify the effect of time-invariant factors. To solve these problems, Blundell, Bond, and Windmeijer (2001) propose the use of the system GMM approach which estimates the difference model in conjunction with the level equation, as proposed by Arellano and Bover (1995). Although the system GMM is asymptotically more efficient than the first difference GMM, it produces biased results. To overcome this problem, we use the two-step estimation method proposed by Windmeijer (2005) for finite sample size variance correction (Roodman 2009). To test the validity of lagged variables as instruments, Arellano and Bond (1991), Arellano and Bover (1995) and Blundell, Bond, and Windmeijer (2001) suggest the Hansen/Sargan over-identification tests. In this work, we use the Hansen test because it is effective in the presence of autocorrelation and heteroscedasticity problems (Roodman 2007; Neanidis and Varvarigos 2009). To test the hypothesis of non-correlation of the error terms, we perform a second-order autocorrelation test because by construction, the first-difference error term is correlated to the first order.

1.5.2 Non linear nexus between corruption and tax revenue

Linear models may oversimplify the complex relationship between corruption and tax revenue, as corruption's impact can vary across levels. To better capture these dynamics, the study uses a more comprehensive empirical approach. The analysis unfolds in four stages: First, fractional polynomial graphs are used to identify complex, non-linear associations. Second, local polynomial smoothing graphs reveal nuanced local patterns. Third, a quadratic estimation using the Generalized Method of Moments (GMM) rigorously tests the relationship and identifies thresholds or turning points. Finally, corruption indices are split into values below and above the identified threshold.

The linear equation (1.1) is then extended to test for non linearity between tax revenue and corruption where all variables except corruption are the same as in this equation, and epsilon is the error term. β_1 and β_2 reflect the non-linear relationship. The expected sign for β_1 is positive, while the expected sign for β_2 is negative. These signs represent an inverse relationship between tax revenue and corruption. Prior to the threshold of corruption, the effect on tax revenue is positive. After a certain level, the effect will be negative. In other words, for low levels of corruption, it is assumed that corruption can be viewed as lubricant for tax revenue. We estimate the threshold or turning point of the parabolic(the inverted U curve) relationship, which is shown below, to measure the level of corruption at which tax revenue begins to decline (threshold or turning point): $Corr^* = -\beta_1/2\beta_2$

Where $Corr^*$ is the turning point level of corruption, and β_1 and β_2 are the coefficients of linear and quadratic term of corruption, respectively.

Panels of Figures 1.5 and 1.6 in Annex 1 suggest that a quadratic model of the type

$$TR_{it} = \alpha + \beta_1 Corr_{it} + \beta_2 Corr_{it}^2 + \beta' X_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (1.2)$$

, fits the data better than a linear regression. This transformation is useful to provide an easier representation of the associated coefficient.

1.6 Estimates and interpretations of results

To estimate the impact of corruption on tax revenues, we use a sample of 122 developing countries over the period 1990–2017. The econometric analysis is conducted in three steps using the Generalized Method of Moments (GMM). First, we estimate equation (1.1) using overall political corruption index from V-Dem and the rescaled ‘control of corruption’ index from the World Bank’s Worldwide Governance Indicators (WGI), inverted such that higher values correspond to higher levels of corruption. We then analyze their effects on total, direct, and indirect tax revenues. Second, we assess the impact of specific dimensions of political corruption executive, administrative, judicial, and legislative on total, direct, and indirect taxes. Third, we estimate equation (1.2) to perform a quadratic analysis, testing for nonlinearities in the relationship and approximating the corruption threshold.

1.6.1 Results of the overall index

Table 1.4 reports the results of the impact of political corruption and WGI indicators on total, indirect, and direct tax revenues. The models appear to be globally well specified. Indeed, the Arellano-Bond AR(2) tests confirm the absence of second-order autocorrelation, and the Hansen test validates the choice of instruments, thereby supporting the robustness of the estimates. Across all specifications, corruption exerts a negative and statistically significant effect on tax revenues. This result is consistent across both WGI and V-Dem overall index of corruption and applies to total, direct, and indirect taxes. The negative coefficients indicate that higher levels of corruption are systematically associated with weaker revenue mobilization. Importantly, the magnitude of the effect is particularly pronounced for indirect taxes, where corruption reduces the government’s ability to collect taxes more strongly. Turning to control variables, the lagged dependent variable is positive and highly significant in all regressions, reflecting the strong persistence of tax revenues over time. Per capita GDP has a positive and significant effect across all models, suggesting that higher levels of development enhance a country’s capacity to mobilize tax revenues. Inflation is also positively correlated with revenues especially with total and direct taxes implying that moderate inflationary environments may favor resource mobilization. Trade openness displays a positive and significant relationship with total and direct tax revenues but remains

insignificant for indirect taxes. This indicates that greater integration into global markets facilitates the collection of revenue, particularly from direct taxation. The share of the urban population (urbanization rate) shows a weakly negative effect, significant only in the indirect tax models, which may reflect difficulties in broadening the tax base in urban settings dominated by informality. Agricultural value added has the expected negative effect on total and direct taxes, consistent with the idea that economies with a large agricultural sector face challenges in mobilizing revenues. Finally, government expenditure (as a proxy for the size of the public sector) has a positive and significant impact on total and indirect tax revenues, consistent with the notion that higher spending requirements stimulate greater tax collection efforts. Overall, the results highlight that corruption systematically erodes tax revenues in developing countries, with a stronger effect on indirect taxation. Control variables generally behave in line with theoretical expectations, particularly GDP per capita, openness, and government expenditure, which contribute positively to revenue mobilization.

Table 1.4: The impact of corruption(WGI and V-DEM) on total taxes, indirect and direct taxes

	Total Taxes		Indirect Taxes		Direct Taxes	
	WGI	V-DEM	WGI	V-DEM	WGI	V-DEM
L.Taxes	0.922*** (0.005)	0.924*** (0.002)	0.893*** (0.002)	0.897*** (0.002)	0.854*** (0.005)	0.806*** (0.003)
Corr	-0.258*** (0.039)	-0.212*** (0.019)	-0.344*** (0.026)	-0.254*** (0.016)	-0.100*** (0.009)	-0.167*** (0.007)
<i>Gdp capita</i>	0.054*** (0.004)	0.054*** (0.003)	0.028*** (0.004)	0.036*** (0.002)	0.011*** (0.002)	0.014*** (0.001)
Infl	0.002*** (0.000)	0.002*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.002*** (0.000)	0.002*** (0.000)
Trade	0.002** (0.000)	0.003*** (0.000)	-0.000 (0.000)	0.000 (0.000)	0.003*** (0.000)	0.003*** (0.000)
Urb	-0.001 (0.001)	0.000 (0.001)	-0.004** (0.001)	-0.002** (0.001)	0.000 (0.001)	0.001 (0.001)
Ag	-0.001 (0.003)	-0.005*** (0.001)	0.006* (0.003)	0.000 (0.001)	-0.006*** (0.001)	-0.009*** (0.001)
Exp	0.000*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.000 (0.000)	-0.000 (0.000)
<i>Cons</i>	1.746*** (0.205)	2.410*** (0.184)	1.880*** (0.165)	2.682*** (0.133)	0.820*** (0.102)	1.944*** (0.074)
Observations	1583	1583	1679	1862	1739	1566
Groups	95	95	102	102	99	99
<i>Instruments</i>	77	90	77	90	77	90
Ar2 p	0.147	0.108	0.127	0.139	0.115	0.090
Hansen p	0.299	0.554	0.189	0.436	0.362	0.500

Note: Pr. AR(2) and Pr. Hansen denote the p-values of Arellano and Bond's (1991) test for second-order autocorrelation in first-differenced residuals and Hansen's (1982) test for the over-identification of instruments, respectively. Significance Codes: *** : 0.01; ** : 0.05; * : 0.1.

1.6.2 Decomposition of corruption

In this sub-section, we assess the impact of the components of political corruption on total taxes. The overall index of political corruption is decomposed into 4 sub-indices; executive corruption, administrative corruption, judicial corruption and legislative corruption. results are presented in Table 1.5. The last column of the table also gives the results for the country's regime corruption index.¹². The Arellano-Bond test for AR(2) shows p-values above 0.05, indicating that there is no significant second-order serial correlation in the differenced residuals. This supports the validity of the model's specification. Additionally, the Hansen test p-values also exceed 0.05, suggesting that the instruments used are valid and exogenous. Overall, these results imply that the GMM model is appropriate, with no major issues of autocorrelation or instrument validity. All coefficients are statistically significant and have the expected signs.

Table 1.6.2 report the regression results for direct and indirect taxes with the overall index and the 4 sub-indices in which they were regressed separately. As can be seen, the coefficients on corruption respectively, are negative and statistically significant. We can also notice that this negative relationship seems more intense with indirect taxes than with direct taxes, which is consistent with some works such as Thornton (2008), Patrick A Imam and Jacobs (2007) and Tanzi and H. R. Davoodi (2000). These studies suggest that the reason why the effect of indirect taxes is more intense is that indirect taxes requiring frequent interactions between tax authorities and individuals are more prone to corruption (Hwang et al. 2002; Thornton 2008; Attila, Chambas, and Combes 2009; Patrick Amir Imam and Jacobs 2014). Indirect taxes, such as taxes on goods and services, are thought to be more corrupt than direct taxes, such as income tax. This can be attributed to a variety of factors. For starters, the collection of indirect taxes frequently involves multiple levels of government, resulting in a lack of transparency in the revenue flow and, as a result, increased opportunities for corruption. Furthermore, indirect taxes are frequently collected through intermediaries such as merchants or wholesalers, who can collude with government officials and engage in corrupt behavior. The indirect tax system is frequently complicated, making it difficult for taxpayers to understand their responsibilities and for the government to enforce

¹²Regime corruption index : is another global index which is composed by three sub indices : Executive corruption index, Legislature corrupt activities and Judicial corruption decision

compliance, resulting in a lack of accountability. This lack of accountability makes it easier for officials to engage in corrupt practices.

Table 1.5: The impact of disaggregated corruption (V-DEM) on total tax revenue

	(1)	(2)	(3)	(4)	(5)
L.Taxes	0.917*** (0.002)	0.917*** (0.002)	0.942*** (0.002)	0.932*** (0.002)	0.935*** (0.002)
Gdp capita	0.057*** (0.002)	0.057*** (0.002)	0.0571*** (0.002)	0.053*** (0.027)	0.057*** (0.003)
Infl	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Trade	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)
Urb	0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.003*** (0.001)	0.000 (0.001)
Agr	-0.005*** (0.001)	-0.005*** (0.001)	-0.002* (0.001)	-0.002 (0.001)	-0.001 (0.001)
Exp	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Judcorr	-0.271*** (0.020)				
Legcorr		-0.271*** (0.020)			
Execorr			-0.189*** (0.018)		
Pubcorr				-0.263*** (0.027)	
Regcorr					-0.208*** (0.017)
Constant	2.736*** (0.180)	2.736*** (0.180)	1.876*** (0.149)	2.649*** (0.225)	2.128*** (0.155)
Observations	1583	1583	1583	1583	1583
Instruments	89	89	89	89	89
Groups	95	95	95	95	95
AR(2)	0.108	0.108	0.108	0.113	0.108
Hansen	0.525	0.525	0.477	0.462	0.507

Note: Pr. AR(2) and Pr. Hansen denote the p-values of Arellano and Bond's (1991) test for second-order autocorrelation in first-differenced residuals and Hansen's (1982) test for the over-identification of instruments, respectively. Significance Codes: *** : 0.01; ** : 0.05; * : 0.1.

Table 1.6: Impact of disaggregated corruption (V-DEM) on direct and indirect taxes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Indirect Taxes					Direct Taxes				
L.Taxes	0.919*** (0.002)	0.910*** (0.002)	0.906*** (0.002)	0.906*** (0.002)	0.899*** (0.003)	0.822*** (0.003)	0.847*** (0.003)	0.801*** (0.002)	0.799*** (0.003)	0.836*** (0.003)
Gdp capita	0.034*** (0.002)	0.032*** (0.003)	0.035*** (0.002)	0.035*** (0.002)	0.033*** (0.003)	0.013*** (0.001)	0.014*** (0.001)	0.016*** (0.001)	0.016*** (0.001)	0.014*** (0.001)
Infl	-0.000 (0.000)	0.000** (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000* (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Trade	0.001*** (0.000)	0.002*** (0.000)	0.001* (0.000)	0.001* (0.000)	0.001* (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.002*** (0.000)	0.002** (0.000)	0.003*** (0.000)
Urb	-0.004*** (0.001)	0.01*** (0.000)	-0.003*** (0.000)	-0.001 (0.001)	-0.001** (0.000)	-0.001 (0.000)	-0.000 (0.000)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Agr	0.000 (0.000)	-0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.000 (0.002)	-0.009*** (0.001)	-0.012*** (0.001)	-0.007*** (0.001)	-0.007*** (0.001)	-0.010*** (0.001)
Expend	0.000*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.001 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000* (0.000)	0.000* (0.000)	-0.000 (0.000)
Pubcorr	-0.217*** (0.013)					-0.153*** (0.006)				
Execorr		-0.248*** (0.017)					-0.058*** (0.006)			
Judcorr			-0.224*** (0.013)					-0.219*** (0.008)		
Legcorr				-0.224*** (0.013)					-0.231*** (0.010)	
Regcorr					-0.272*** (0.018)					-0.103*** (0.006)
Observations	1862	1862	1862	1862	1862	1739	1739	1739	1739	1739
Groups	102	102	102	102	102	99	99	99	99	99
Instruments	90	90	90	90	90	90	90	90	89	90
AR(2)	0.142	0.136	0.136	0.136	0.137	0.093	0.096	0.099	0.093	0.095
Hansen	0.330	0.523	0.381	0.381	0.522	0.499	0.402	0.422	0.388	0.515

Note: Pr. AR(2) and Pr. Hansen denote the p-values of Arellano and Bond's (1991) test for second-order autocorrelation in first-differenced residuals and Hansen's (1982) test for the over-identification of instruments, respectively. Significance codes: *** : 0.01; ** : 0.05; * : 0.1.

1.6.3 Nonlinear model results

Our findings are presented in Tables 1.7, 1.8, and 1.9. These tables indicate that the GMM specification is well behaved. Arellano–Bond AR(2) p-values exceed 0.05, ruling out second-order serial correlation in the differenced residuals, and Hansen p-values are also above 0.05, supporting the joint validity and exogeneity of the instrument set. Overall, there is no evidence of major autocorrelation or instrument problems.

The quadratic specification shows that, across most corruption indices, both the linear term (β_1) and the squared term (β_2) are statistically significant. For the political corruption index, the linear coefficient equals 0.754 and the rescaled squared coefficient equals -0.078 , implying concavity. In this setting, the turning point is computed from the estimated model using the standard quadratic formula:

$$\text{Corr}^* = -\frac{\beta_1}{2\beta_2}, \quad (1.3)$$

where Corr^* denotes the corruption level at which the marginal effect changes sign, and β_1 and β_2 are the coefficients on the linear and squared corruption terms, respectively. For political corruption, $\text{Corr}^* \approx 4.794$. We use these empirically derived thresholds to estimate split-sample GMM models below and above the turning points; Tables 1.7 and 1.9 report the corresponding results. In all cases, coefficients are positive below the thresholds and negative above, confirming a nonlinear relationship between corruption and tax revenue. Patterns shown in Figures 1.4, align with a quadratic specification, confirming a nonlinear relationship.

The disaggregated V-Dem measures corroborate this pattern. Quadratic estimates (Table 1.8) imply turning points that are then imposed in the threshold analysis (Table 1.9). For regime corruption, the implied threshold is $\kappa = 3.813$, with a positive effect below the threshold and a negative effect above it. For executive corruption, the threshold is $\kappa = 5.059$, again yielding a sign flip from positive to negative. For public-sector (administrative) corruption, the threshold is higher, $\kappa = 6.310$, indicating that adverse effects materialize only at relatively elevated corruption levels. Judicial and legislative corruption exhibit negative linear effects on revenue, while their quadratic terms are positive but not statistically significant, indicating weak or imprecisely estimated curvature.

The positive marginal effect below the thresholds aligns with the “grease the wheels” mechanism: where higher-level oversight remains relatively clean or incentive schemes function tolerably well, modest corruption can co-exist with higher recorded collections, for instance via stronger effort or faster dispute settlement. Consistent with Fjeldstad and Tungodden (2003) and Chand and Moene (1999), bonus systems can raise revenue when senior bureaucrats are not predatory. Once the relevant threshold is crossed, however, the marginal effect turns negative, echoing the “sand the wheels” view: entrenched rent extraction at upper tiers weakens incentives, erodes compliance, and depresses the tax base, which matches Fjeldstad and Tungodden (2003)’s argument about the collapse of performance pay under corrupt superiors. Moreover, Liu and Mikesell (2019) note that corrupt officials often engineer more opaque, indirect-tax-heavy systems; such complexity can initially inflate recorded revenue but ultimately undermines trust and compliance. Three forces likely drive the observed nonlinearity: institutional context (oversight quality at the top), measurement (different corruption dimensions and rescaling may compress upper-tail variation), and modeling choices (consistent evidence from both quadratic curvature and threshold splits).

Control estimates largely follow theoretical priors. Real GDP per capita and trade openness are associated with higher revenue, though the openness effect weakens at high corruption. A larger agricultural share correlates with lower revenue but becomes insignificant once corruption surpasses the thresholds, consistent with compliance erosion dominating structural constraints. Government spending is mildly positive, suggestive of administrative scale effects. Inflation is positively correlated with nominal collections in moderate-inflation environments, an association that fades as corruption intensifies.

These patterns can be interpreted in light of three factual considerations. First, institutional context: when senior bureaucrats are not predatory, performance pay and expedited dispute resolution are associated with higher effort and collections; where upper tiers are captured, bargaining power shifts toward rent extraction and the marginal effect turns negative (Fjeldstad and Tungodden 2003). Second, The disaggregated V-Dem indicators separate different forms of corruption (regime, executive, administrative). Rescaling helps make these measures comparable across models, but it can also compress the highest values and, as a result, cluster the estimated turning points. Finally, The agreement

between the quadratic model and the threshold splits supports the nonlinearity finding. Taken together, the evidence places the “grease” and “sand” views on different parts of the same curve: limited corruption can coincide with higher recorded revenue, but once corruption passes empirically identified thresholds, the relationship reverses and revenue falls. This theory-to-turning-point link motivates the threshold-based GMM estimates that follow and clarifies the institutional conditions under which corruption helps or harms tax mobilization.

Table 1.7: Quadratic Estimation and Threshold Analysis of Corruption (V-DEM) on Total Tax Revenue

	(1)	(2)	(3)
L.Taxes	0.921*** (0.001)	0.937*** (0.007)	0.938*** (0.009)
Gdp capita	0.059*** (0.002)	0.051*** (0.006)	0.062*** (0.006)
Infl	0.002*** (0.000)	0.002*** (0.000)	0.003*** (0.000)
Trade	0.002*** (0.000)	0.004*** (0.001)	-0.000 (0.001)
Urb	0.000 (0.000)	0.000 (0.002)	0.003 (0.004)
Agr	-0.005*** (0.001)	0.006*** (0.000)	0.007 (0.005)
Exp	0.000* (0.000)	0.000 (0.230)	-0.001* (0.001)
Constant	1.735*** (0.286)	0.669*** (0.230)	7.243*** (1.054)
Corruption	0.754** (0.196)		
Corruption $\times$ Corruption	-0.078*** (0.018)		
<Threshold		0.138*** (0.026)	
>Threshold			-0.868*** (0.116)
Observations	1678	1678	1678
Instruments	66	66	62
Groups	95	82	95
AR(2)	0.111	0.140	0.104
Hansen	0.287	0.408	0.560

Note: Pr. AR(2) and Pr. Hansen denote the p-values of Arellano and Bond's (1991) test for second-order autocorrelation in first-differenced residuals and Hansen's (1982) test for the over-identification of instruments, respectively. Significance Codes: *** : 0.01; ** : 0.05; * : 0.1.

Table 1.8: Quadratic estimation of disaggregated corruption (V-DEM) on total tax revenue

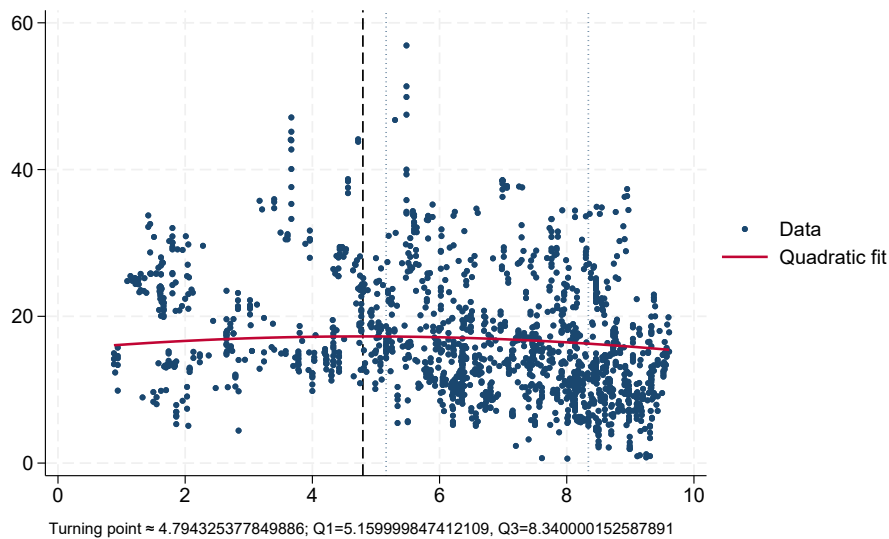
	(1)	(2)	(3)	(4)	(5)	(6)
L.Taxes	0.914*** (0.010)	0.924*** (0.008)	0.907*** (0.004)	0.992*** (0.008)	0.921*** (0.001)	0.926*** (0.008)
Gdp capita	0.057*** (0.006)	0.067*** (0.007)	0.056*** (0.004)	0.065*** (0.007)	0.059*** (0.002)	0.051*** (0.007)
Infl	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Trade	0.004*** (0.001)	0.005*** (0.001)	0.007*** (0.000)	-0.000 (0.001)	0.002*** (0.000)	0.004*** (0.001)
Urb	0.004 (0.002)	0.003 (0.002)	0.000 (0.001)	-0.005* (0.001)	0.000 (0.000)	0.002 (0.002)
Agr	-0.002 (0.005)	0.003 (0.004)	-0.003 (0.002)	-0.011* (0.005)	-0.005*** (0.001)	-0.001 (0.005)
Exp	0.000 (0.000)	-0.000 (0.497)	-0.001** (0.000)	-0.000* (0.000)	0.000* (0.000)	0.004* (0.002)
Judcorr	-0.727* (0.355)					
Judcorr ²	0.039 (0.030)					
Regcorr		0.535** (0.174)				
Regcorr ²		-0.070*** (0.016)				
Execorr			2.601*** (0.221)			
Execorr ²			-0.257*** (0.020)			
Pubcorr				1.300** (0.326)		
Pubcorr ²				-0.103*** (0.025)		
Polcorr					0.754** (0.196)	
Polcorr ²					-0.078*** (0.018)	
Legcorr						-0.727** (0.275)
Legcorr ²						0.039 (0.183)
Constant	3.647** (1.109)	0.431 (0.497)	0.023 (0.118)	-1.639** (0.766)	1.735*** (0.286)	1.301*** (0.355)
Observations	1583	1583	1583	1583	1583	1583
Instruments	63	66	89	63	66	63
Groups	99	95	95	95	95	99
AR(2)	0.105	0.114	0.110	0.105	0.111	0.105
Hansen	0.437	0.367	0.413	0.109	0.287	0.437

Note: Pr. AR(2) and Pr. Hansen denote the p-values of Arellano and Bond's (1991) test for second-order autocorrelation in first-differenced residuals and Hansen's (1982) test for the over-identification of instruments, respectively. Significance Codes: *** : 0.01; ** : 0.05; * : 0.1.

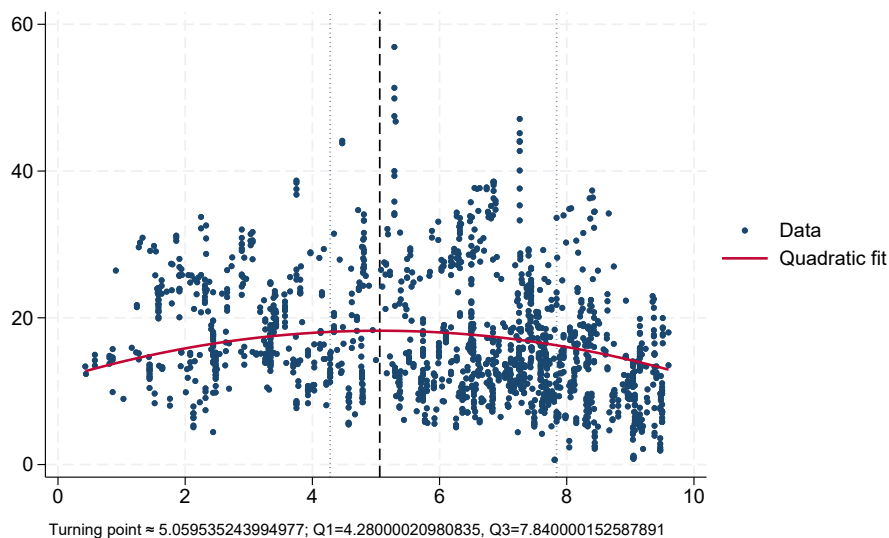
Table 1.9: Threshold Analysis of Disaggregated Corruption (V-DEM) on Total Tax Revenue

	(1)		(2)		(3)	
	Threshold=3.821		Threshold=5.060		Threshold=6.310	
	<	>	<	>	<	>
L.Taxes	0.904*** (0.009)	0.862*** (0.009)	0.865*** (0.009)	0.867*** (0.009)	0.863*** (0.009)	0.863*** (0.009)
Gdp capita	0.120*** (0.016)	0.093*** (0.014)	0.097*** (0.015)	0.096*** (0.015)	0.090*** (0.014)	0.088*** (0.015)
Infl	0.008*** (0.002)	0.005*** (0.000)	0.005*** (0.000)	0.005*** (0.000)	0.005*** (0.000)	0.005*** (0.000)
Trade	0.024*** (0.003)	0.037*** (0.003)	0.038*** (0.004)	0.039*** (0.003)	0.039*** (0.003)	0.039*** (0.003)
Urb	0.007** (0.003)	0.008** (0.003)	0.003 (0.003)	0.006* (0.003)	0.004 (0.003)	0.004 (0.004)
Agr	-0.001 (0.006)	0.000 (0.007)	-0.006 (0.006)	-0.000*** (0.006)	-0.005 (0.006)	-0.003 (0.006)
Exp	0.000** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Constant	-0.727* (0.407)	0.174 (0.461)	-0.663 (0.478)	-0.219 (0.483)	-0.675** (0.230)	0.289 (1.054)
Regcorr	0.187** (0.090)	-0.146*** (0.041)				
Execorr			0.190*** (0.040)	-0.116*** (0.025)		
Pubcorr					0.076*** (0.027)	-0.053** (0.027)
Observations	1678	1678	1678	1678	1678	1678
Instruments	57	60	60	60	60	60
Groups	95	95	95	95	95	95
AR(2)	0.121	0.126	0.136	0.134	0.127	0.129
Hansen	0.337	0.247	0.257	0.259	0.284	0.291

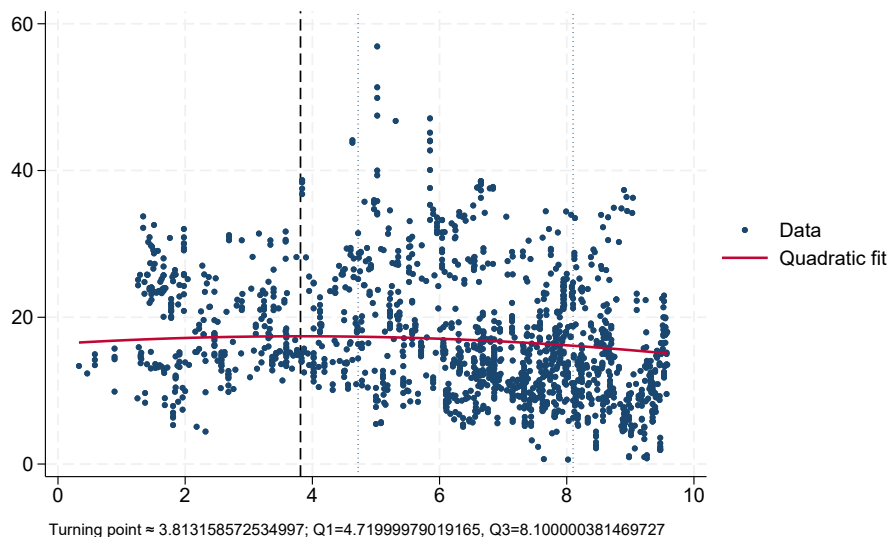
Note: Pr. AR(2) and Pr. Hansen denote the p-values of Arellano and Bond's (1991) test for second-order autocorrelation in first-differenced residuals and Hansen's (1982) test for the over-identification of instruments, respectively. Significance Codes: *** : 0.01; ** : 0.05; * : 0.1.



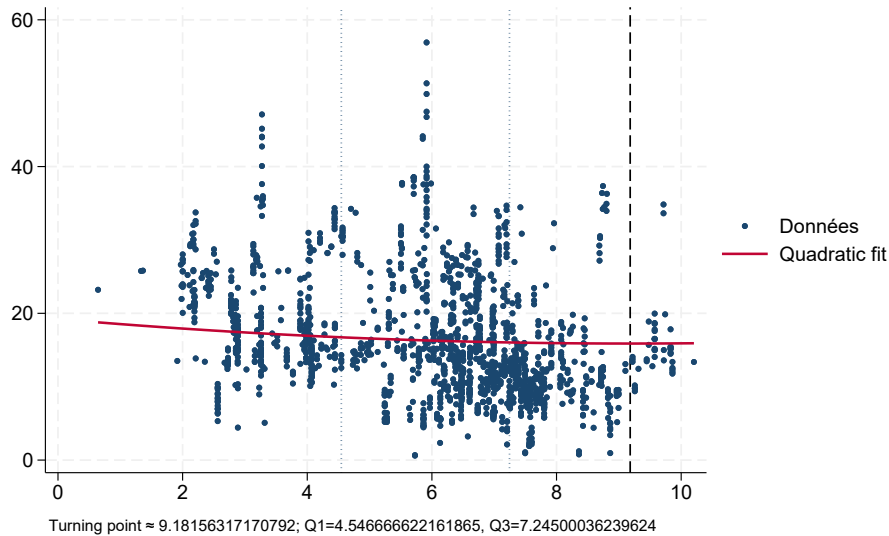
(a) Impact of Aggregated corruption on Tax revenue



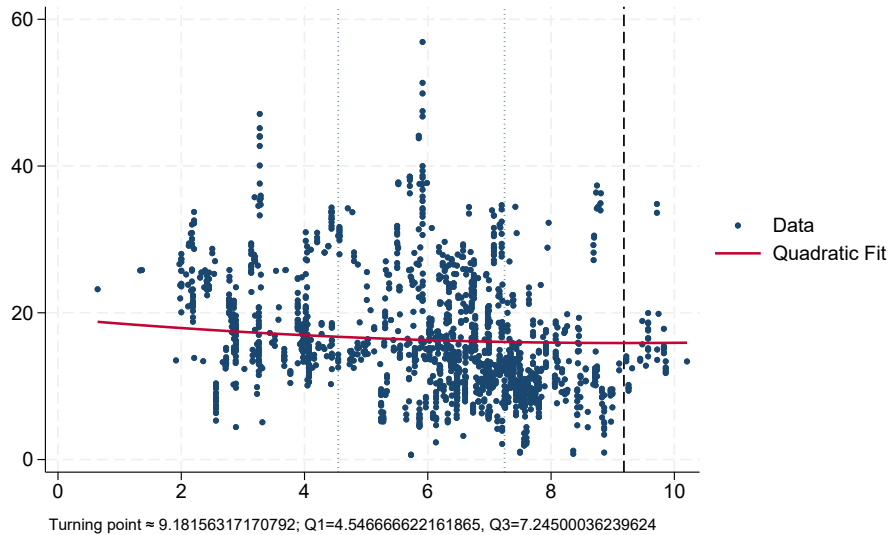
(b) Impact of Executive corruption on Tax revenue



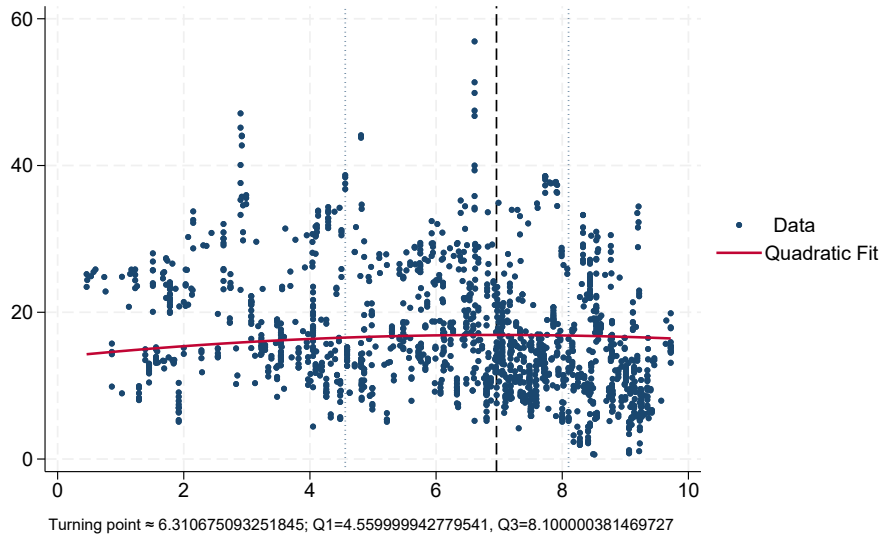
(c) Impact of Regime corruption on Tax revenue



(a) Impact of Judicial Corruption on Tax revenue



(b) Impact of Legislative corruption on Tax revenue



(c) Impact of Administrative corruption on Tax revenue

Figure 1.4: Non linear Relationship

1.7 Robustness tests

We test the robustness of our results by introducing new control variables and removing some previously used ones. Various other factors could influence the relationship between corruption and tax revenue. Therefore, we re-estimate our basic model while accounting for these additional factors. Initially, we individually add variables to control for the effect of corruption on tax revenue. In Table 1.10, from column (1) to column (14), we include FDI, education, unemployment, labor force participation, dummy variables for low-income, lower-middle-income, and upper-middle-income countries, governance indicators. Data for Governance are obtained from the World Governance Indicators Database. The other variables are sourced from World Development Database. Except for the "Control of Corruption" indicator, we included the remaining five governance indicators in our analysis. In addition, we incorporate Polity2 index sourced from polity IV as a measure of the level of democracy. To complement the analysis, we constructed a mean governance indicator (Mean Governance) and a composite index based on the five selected governance indicators using principal component analysis method (PCA).

Then, we sequentially drop the control variables used in the baseline estimation in Table 1.11. The results indicate that our findings remain robust¹³, but it was evident that indirect taxes are more affected by corruption than direct taxes. When examining the coefficients related to corruption, we observed that the coefficients for indirect taxes were higher. This aligns with studies by Thornton (2008), Patrick A Imam and Jacobs (2007), and Tanzi and H. R. Davoodi (2000), which suggest that the pronounced effect on indirect taxes is due to their frequent interactions between tax authorities and individuals, making them more susceptible to corruption. Results of this test are presented in Table 1.12.

Finally, We conducted another robustness check by excluding outliers in terms of inflation from our sample (see Figure 1.2 above). We dropped Brazil, the Democratic Republic of Congo (DRC) and Ukraine from our sample as part of a robustness check to make sure our results are not affected by extreme values of inflation rates. These countries experienced very high inflation in 1990s, which could distort the overall findings. Brazil had hyperinflation in the early 1990s, before the government introduced the Plano Real to stabilize the economy. The DRC faced severe economic problems, including

¹³As governance data are available only from 1996 onward, all regressions are restricted to the period 1996-2017.

hyperinflation collapsing currency, and conflicts like the First Congo War (1996–1997), which worsened the situation. Ukraine also experienced one of the worst inflation crises in history in 1993 after the Soviet Union collapsed, and the government printed too much money. Since these extreme cases could make the analysis less reliable, we excluded them to see if our results still hold for countries with more stable inflation. This helps make sure our findings are more accurate and applicable to a wider range of countries. Results of this test are presented in Table [1.13](#).

1.8 Conclusions

The main objective of this chapter is to analyze the effect of disaggregated corruption on tax revenue using GMM estimations for a panel of 122 developing countries over the period 1990–2017. The findings reveal a nonlinear relationship between corruption and tax revenue. While previous studies have explored this nonlinearity, they typically use aggregate corruption indicators and assume a uniform effect across all types and levels of corruption. In contrast, this chapter contributes by employing disaggregated corruption measures to examine how their effects on tax revenue vary nonlinearly with corruption intensity. The analysis shows that a linear model oversimplifies this relationship. To address this, the empirical strategy uses a nonlinear (quadratic) framework to better capture the varying impacts of corruption based on its type and level. Results from the linear model show that corruption reduces indirect tax revenues more than direct tax revenues. In addition, results confirm a nonlinear (hump-shaped) relationship, indicating that corruption's effect on tax revenue mobilization depends on its intensity: revenue tends to increase at low levels of corruption but declines once corruption exceeds a certain threshold. The nonlinear analysis shows that while limited corruption may ease bureaucratic delays, higher levels promote tax evasion and erode public trust. This supports the conditional “grease the wheels” hypothesis: in weak institutional settings, minor corruption might temporarily aid tax collection by reducing red tape. As corruption increases, its harmful effects such as rent seeking, tax evasion, and institutional erosion begin to outweigh any short-term benefits, ultimately reducing tax revenue.

When breaking corruption down into its various dimensions using V-Dem data, a similar hump-shaped relationship emerges. Judicial and legislative corruption show a negative impact on revenue, while their quadratic terms are positive but not statistically significant. In contrast, administrative, executive, and regime corruption display a positive linear effect, but their quadratic terms are negative, suggesting diminishing returns at higher levels. At low levels, these forms of corruption may ease bureaucratic inefficiencies and support revenue collection. However, beyond a certain threshold, rising corruption reduces compliance and trust in tax institutions.

While our findings suggest a nonlinear relationship between corruption and tax revenue, these results should be interpreted with caution due to potential endogeneity. To strengthen causal inference,

future work should explicitly incorporate governance indicators to test whether institutional quality systematically moderates the effect of disaggregated corruption on revenue mobilization. As highlighted by Méon and Sekkat (2005) and Bogetić and Naeher (2024b), such analysis would clarify whether the “grease the wheels” effect persists only in near-failed states (Houston 2007) or reverses at intermediate governance levels.

Based on this study, anti-corruption policy in developing countries should be differentiated and strategic: prioritize eradicating judicial and legislative corruption, as even minor abuses in these branches reduce tax revenues. Focus enforcement where taxpayer–official contacts are most frequent, notably indirect taxes (VAT, customs, excises). Do not tolerate “threshold” effects; instead, convert any short-run gains into structural efficiency by digitizing tax collection, and aligning public-official incentives with performance and integrity.

1.9 Annex 1

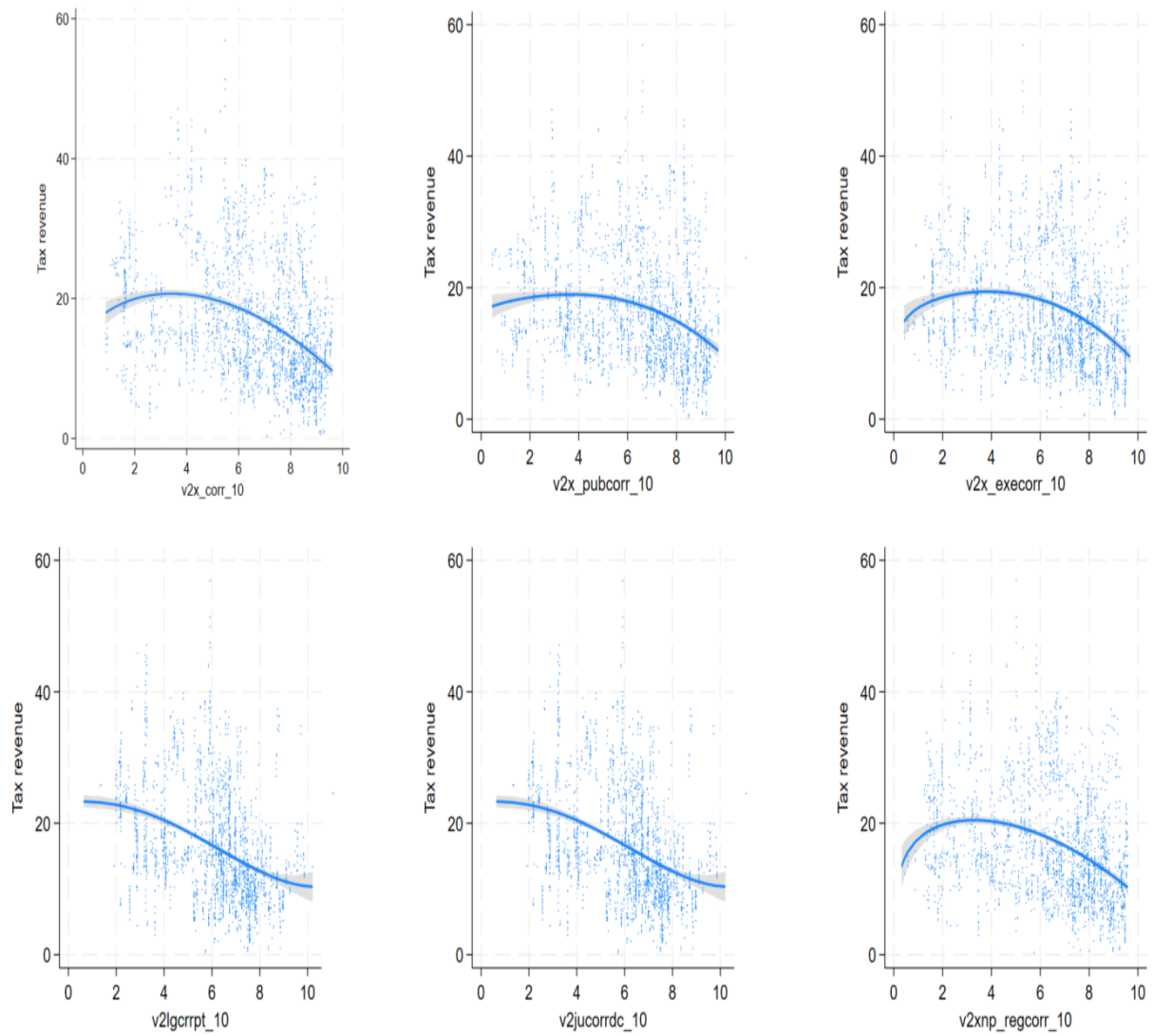


Figure 1.5: Fractional polynomial: The scatter plot is corruption versus Tax revenue. The line is the best fit quadratic function.

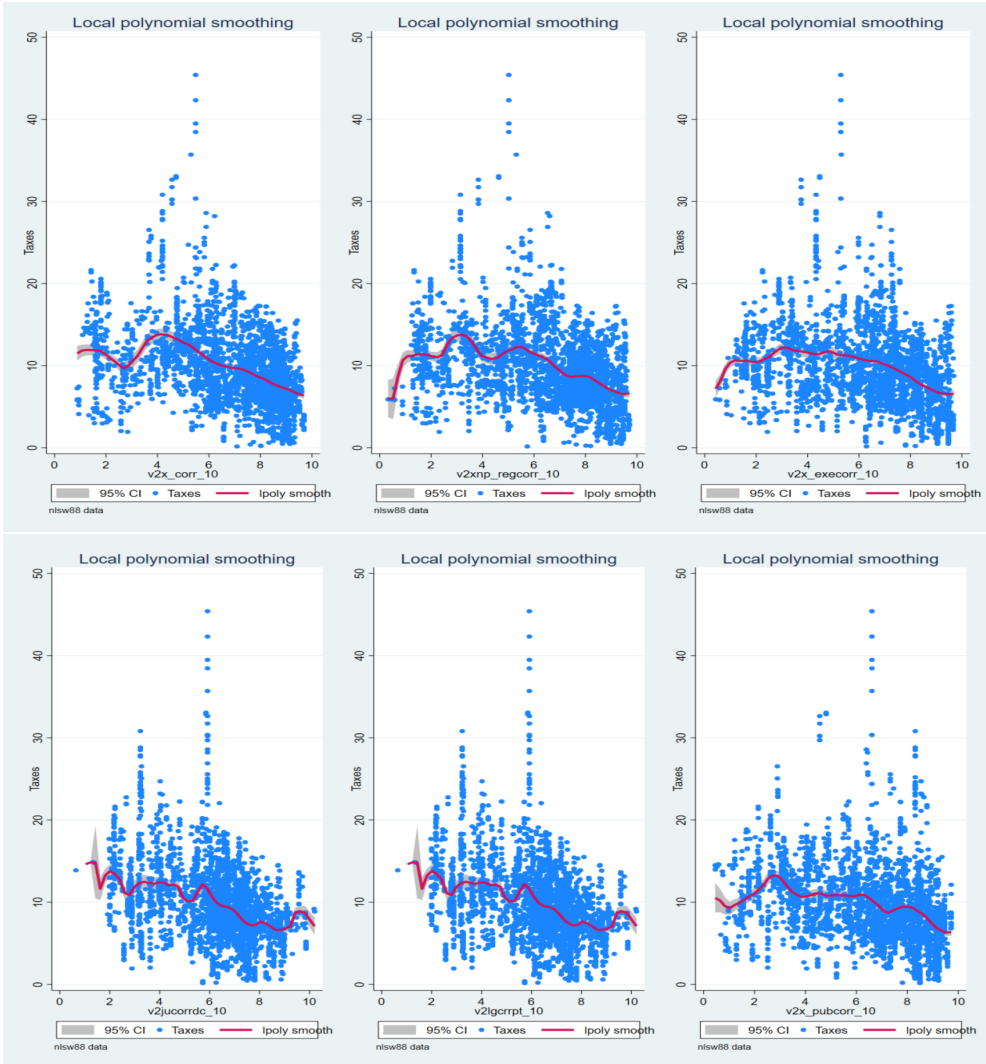


Figure 1.6: Scatter plots fitted with local polynomial smoothing

Table 1.10: Variable definitions and sources

Variable	Definition	Source
Total tax revenue	Ratio of total tax revenue % GDP	ICTD/UNU-WIDER Government Revenue Dataset (GRD)
Direct taxes	Personal and corporate income tax revenue % GDP.	ICTD/UNU-WIDER GRD
Indirect taxes	VAT, excise, and trade tax revenue % GDP.	ICTD/UNU-WIDER GRD
Political Corruption index (aggregate)	Average of public sector, executive, legislative, and judicial corruption indicators; continuous scale from 0 (least corrupt) to 1 (most corrupt).	V-Dem
Executive corruption	Corruption within the executive; distinguishes bribery-related and embezzlement-related practices. Scale 0–1 (higher = more corrupt).	V-Dem
Administrative corruption	Corruption in the general public administration. Scale 0–1 (higher = more corrupt).	V-Dem
Legislative corruption	Corruption affecting the legislature. For countries without a legislature, V-Dem imputes using other pillars (McMann et al., 2016). Scale 0–1.	V-Dem
Judicial corruption	Corruption within the judiciary. Scale 0–1 (higher = more corrupt).	V-Dem
Regime corruption	Composite capturing regime-level corrupt practices. Scale 0–1 (higher = more corrupt).	V-Dem
Control of Corruption	Perception-based governance indicator capturing the extent to which public power is exercised for private gain; standardized scale from –2.5 (weak control, more corruption) to +2.5 (strong control, less corruption).	WGI-WB
GDP per capita growth	Annual percentage growth of GDP per capita (constant local currency methodology). Proxy for development level(annual %).	WDI-WB
Inflation	Annual percentage change in the consumer price index. Captures macroeconomic conditions(annual %) .	WDI-WB
Trade openness	Sum of exports and imports of goods and services as a percentage of GDP (% of GDP).	WDI-WB
Government expenditure	Ratio of total government expenditure to GDP (% of GDP).	WDI-WB
Agriculture, value added	Share of agriculture (incl. forestry, hunting, fishing, crops, livestock) in GDP.	WDI-WB
Urbanization	Share of the population living in urban areas (national definitions).	WDI-WB

Variable	Definition	Source
Ethnolinguistic fragmentation	Index in $[0, 1]$ measuring the probability that two randomly chosen individuals belong to different ethnolinguistic groups (higher = more fragmented).	Alesina et al. (2003) as used in Baum et al. (2017)
Religious fragmentation	Index in $[0, 1]$ measuring the probability that two randomly chosen individuals follow different religions (higher = more fragmented).	Alesina et al. (2003); as used in Baum et al. (2017)
FDI inflows	Net foreign direct investment inflows as a percentage of GDP.	WDI-WB
Education	Gross secondary school enrollment ratio; proxy for human capital.	WDI-WB
Unemployment	Unemployment rate as a percentage of the total labor force (ILO modeled estimate).	WDI-WB
Labor force participation	Labor force participation rate as a percentage of population ages 15+ (modeled ILO estimate).	WDI-WB
Income group dummies	Indicators for low-income, lower-middle-income, and upper-middle-income groups (time-varying classification).	World Bank classification
Voice and Accountability	Perceptions of participation in selecting government, freedom of expression, association, and media. Scale $[-2.5, 2.5]$ (higher = better).	WGI-WB
Political Stability and Absence of Violence/Terrorism	Perceptions of likelihood of political instability and/or politically motivated violence. Scale $[-2.5, 2.5]$.	WGI-WB
Government Effectiveness	Perceptions of quality of public services, civil service, policy formulation and implementation. Scale $[-2.5, 2.5]$.	WGI-WB
Regulatory Quality	Perceptions of the ability to formulate and implement sound policies/regulations. Scale $[-2.5, 2.5]$.	WGI-WB
Polity2	Institutionalized democracy–autocracy score; range $[-10, 10]$ (higher = more democratic).	Polity IV
Mean Governance	Simple average of the four WGI indicators above (excludes Control of Corruption). Higher values indicate stronger governance.	Author's construction based on WGI
Governance PCA index	First principal component of the four WGI indicators above; standardized (mean 0, sd 1) for comparability.	Author's construction (PCA) based on WGI

Table 1.11: Robustness Check: Adding Control Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
L.Taxes	0.922*** (0.002)	0.917*** (0.002)	0.932*** (0.003)	0.932*** (0.004)	0.930*** (0.002)	0.922*** (0.001)	0.969*** (0.009)	0.893*** (0.010)	0.952*** (0.016)	0.934*** (0.010)	0.936*** (0.017)	0.897*** (0.017)	0.914*** (0.009)	0.896*** (0.009)
Growth	0.058*** (0.003)	0.061*** (0.003)	0.060*** (0.004)	0.064*** (0.004)	0.060*** (0.002)	0.058*** (0.003)	0.069*** (0.007)	0.050*** (0.010)	0.049*** (0.012)	0.057*** (0.007)	0.046*** (0.013)	0.053*** (0.013)	0.049*** (0.009)	0.054*** (0.008)
Infl	0.002*** (0.000)	0.007*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.003*** (0.000)	0.003*** (0.0003)	0.002*** (0.0002)	0.003*** (0.001)	0.002*** (0.0003)	0.002*** (0.0002)	0.002*** (0.0002)	0.002*** (0.0002)
Trade	0.001*** (0.006)	0.001*** (0.000)	0.004*** (0.000)	0.003*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.000 (0.002)	0.003 (0.003)	0.004 (0.005)	0.006 (0.002)	0.005 (0.004)	0.013** (0.005)	0.003 (0.003)	0.005** (0.002)
Urb	0.000 (0.001)	0.002* (0.001)	-0.000 (0.002)	0.001 (0.002)	0.001 (0.001)	0.002* (0.001)	0.003 (0.004)	0.002 (0.005)	0.001 (0.007)	-0.001 (0.004)	0.000 (0.008)	0.001 (0.008)	0.002 (0.005)	0.001 (0.005)
Agr	-0.003** (0.001)	0.001 (0.002)	-0.008 (0.005)	-0.006 (0.005)	-0.006*** (0.001)	-0.002* (0.001)	-0.008 (0.007)	0.029** (0.013)	0.001 (0.014)	-0.013 (0.008)	0.006 (0.016)	-0.006 (0.016)	0.029** (0.013)	0.021** (0.010)
Exp	0.000 (0.000)	-0.001 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.001* (0.000)	-0.001 (0.001)	-0.002 (0.001)	-0.001* (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.001 (0.001)	0.000 (0.001)
Constant	-0.363 (0.331)	-4.356*** (0.358)	-2.974*** (0.380)	-4.717*** (0.614)	0.892** (0.343)	1.465*** (0.356)	-5.634 (1.112)	-1.001 (1.226)	-3.746*** (1.253)	-3.619*** (0.856)	-3.336** (1.430)	-3.751** (1.484)	-1.001 (1.226)	-1.101 (1.024)
FDI	0.031*** (0.001)													
Education		0.017*** (0.000)												
Unemployment			-0.004 (0.004)											
Labor force				0.013*** (0.004)										
Dummy LIC					0.340*** (0.087)									
Dummy LMC						0.132** (0.055)								
Dummy UMC							-0.196 (0.180)							
Mean Governance								2.086*** (0.461)						
PCA									0.371* (0.210)					
Polity2										0.108*** (0.013)				
Political Stability											0.542** (0.208)			
Voice and Accountability												1.036*** (0.345)		
Government Effectiveness													1.073*** (0.277)	
Regulatory Quality														1.270*** (0.261)
Corruption	1.060*** (0.106)	1.973*** (0.103)	0.464*** (0.114)	2.353*** (0.155)	0.277** (0.138)	2.605*** (0.426)	0.445*** (0.096)	1.751*** (0.436)	2.180*** (0.428)	1.761*** (0.339)	2.144*** (0.524)	2.264*** (0.536)	1.751*** (0.436)	1.594*** (0.338)
Corruption*Corruption	-0.116*** (0.009)	-0.195*** (0.009)	-0.064*** (0.010)	-0.223*** (0.014)	-0.048*** (0.012)	-0.227*** (0.036)	-0.057*** (0.008)	-0.176*** (0.039)	-0.204*** (0.039)	-0.152*** (0.032)	-0.199*** (0.048)	-0.197*** (0.048)	-0.176*** (0.039)	-0.167*** (0.031)
Observations	1565	1354	1678	1678	1678	1678	1678	1254	1254	1477	1258	1258	1254	1254
Instruments	91	90	87	87	90	90	65	65	50	66	50	50	65	65
Groups	94	91	95	95	95	95	95	95	95	89	95	95	95	95
AR(2)	0.094	0.208	0.115	0.118	0.113	0.111	0.115	0.133	0.128	0.118	0.128	0.124	0.133	0.126
Hansen	0.403	0.586	0.434	0.385	0.412	0.424	0.288	0.358	0.521	0.406	0.396	0.419	0.358	0.361

Note: Pr. AR(2) and Pr. Hansen denote the p-values of Arellano and Bond's (1991) test for second-order autocorrelation in first-differenced residuals and Hansen's (1982) test for the over-identification of instruments, respectively. Significance codes: *** : 0.01; ** : 0.05; * : 0.1.

Table 1.12: Robustness Check: Dropping Control Variables

	(1)	(2)	(3)	(4)	(5)	(6)
L.Taxes	0.906*** (0.001)	0.938*** (0.005)	0.952*** (0.002)	0.938*** (0.004)	0.952*** (0.004)	0.927*** (0.005)
Gdp capita		0.059*** (0.004)	0.068*** (0.004)	0.062*** (0.005)	0.031*** (0.002)	0.062*** (0.004)
Infl	0.002*** (0.000)		0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.000*** (0.000)
Trade	0.004*** (0.000)	0.005*** (0.001)		0.002*** (0.002)	0.001 (0.001)	0.004*** (0.001)
Urb	-0.001 (0.001)	0.002 (0.001)	-0.001 (0.003)		-0.001 (0.002)	-0.000 (0.003)
Agr	-0.006*** (0.002)	-0.005 (0.005)	-0.000 (0.006)	-0.002 (0.004)		-0.006 (0.004)
Exp	0.003* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	
Constant	0.980*** (0.303)	-1.034*** (0.642)	-3.554*** (0.444)	-3.357*** (0.398)	-2.716*** (0.606)	-2.075*** (0.509)
Corruption	1.588*** (0.204)	0.591*** (0.122)	2.275*** (0.163)	2.171*** (0.149)	1.947*** (0.221)	1.726*** (0.145)
Corruption*Corruption	-0.171*** (0.018)	-0.074*** (0.018)	-0.219*** (0.015)	-0.210*** (0.013)	-0.192*** (0.020)	-0.172*** (0.013)
Observations	1606	1766	1678	1678	1632	1731
Instruments	89	89	85	85	85	85
Groups	100	100	95	95	95	95
AR(2)	0.144	0.144	0.117	0.116	0.103	0.142
Hansen	0.357	0.357	0.406	0.403	0.490	0.297

Note: Pr. AR(2) and Pr. Hansen denote the p-values of Arellano and Bond's (1991) test for second-order autocorrelation in first-differenced residuals and Hansen's (1982) test for the over-identification of instruments, respectively. Significance codes: *** : 0.01; ** : 0.05; * : 0.1.

Table 1.13: Impact of disaggregated corruption (V-DEM) on direct and indirect taxes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Indirect Taxes						Direct Taxes					
L.Taxes	0.928*** (0.008)	0.937*** (0.002)	0.862*** (0.007)	0.844*** (0.007)	0.874*** (0.007)	0.842*** (0.007)	0.943*** (0.011)	0.954*** (0.004)	0.923*** (0.004)	0.905*** (0.021)	0.905*** (0.021)	0.928*** (0.003)
Gdp capita	0.042*** (0.005)	0.037*** (0.002)	0.043*** (0.005)	0.035*** (0.005)	0.044*** (0.004)	0.036*** (0.005)	0.000 (0.003)	0.001 (0.001)	0.004** (0.001)	-0.000 (0.003)	-0.000 (0.003)	0.003** (0.001)
Infl	0.000 (0.000)	0.000 (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000** (0.000)	0.000 (0.000)	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000** (0.000)
Trade	0.000 (0.002)	0.001*** (0.000)	0.012*** (0.001)	0.001 (0.001)	0.006*** (0.001)	0.001 (0.001)	0.001*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.001*** (0.000)
Urb	-0.003 (0.003)	-0.005*** (0.001)	0.002 (0.001)	0.000 (0.002)	0.002 (0.002)	0.000 (0.003)	0.001 (0.001)	-0.000** (0.000)	0.000* (0.000)	0.003* (0.001)	0.003* (0.001)	0.000 (0.000)
Agr	0.002 (0.006)	0.002* (0.001)	0.014*** (0.005)	0.000 (0.004)	0.006 (0.004)	0.000 (0.004)	0.000 (0.001)	-0.001 (0.000)	-0.001 (0.001)	0.004* (0.002)	0.004* (0.002)	-0.001*** (0.000)
Expend	-0.000 (0.000)	0.000*** (0.171)	-0.000* (0.000)	0.001*** (0.000)	-0.000 (0.000)	0.001*** (0.000)	0.000* (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Corruption	1.154*** (0.198)						0.125* (0.065)					
Corruption ²	-0.121*** (0.018)						-0.016* (0.006)					
Pubcorr		0.238*** (0.061)						0.125*** (0.017)				
Pubcorr ²		-0.041*** (0.006)						-0.014*** (0.001)				
Execorr			2.493*** (0.189)						0.411*** (0.028)			
Execorr ²			-0.257*** (0.016)						-0.041*** (0.002)			
Judcorr				-0.333* (0.181)						-0.314** (0.124)		
Judcorr ²				0.001 (0.015)						0.016 (0.010)		
Legcorr					-0.412** (0.194)						-0.314** (0.124)	
Legcorr ²					0.007 (0.016)						0.016 (0.010)	
Regcorr						1.758*** (0.109)						0.208*** (0.026)
Regcorr ²						-0.189*** (0.010)						-0.023*** (0.002)
Observations	1862	1862	1862	1957	1957	1862	1701	1701	1701	1773	1773	1701
Groups	102	102	102	102	106	102	98	98	98	102	102	98
Instruments	66	92	89	65	89	63	66	92	89	53	53	89
AR(2)	0.140	0.144	0.149	0.139	0.146	0.139	0.792	0.824	0.806	0.802	0.802	0.809
Hansen	0.231	0.286	0.501	0.308	0.405	0.260	0.615	0.358	0.588	0.649	0.649	0.615

Table 1.14: Robustness check excluding outliers in terms of inflation

	(1)	(2)	(3)
L.Taxes	0.924*** (0.002)		
L.Indirect taxes		0.899*** (0.003)	
L.Direct taxes			0.912*** (0.004)
Corruption	-0.204*** (0.018)	-0.235*** (0.016)	-0.090*** (0.005)
Gdp capita	0.053*** (0.003)	0.037*** (0.003)	0.002 (0.001)
Infl	0.002*** (0.000)	-0.000 (0.000)	-0.000 (0.000)
Trade	0.003*** (0.000)	0.001 (0.001)	0.001*** (0.000)
Urb	0.001 (0.001)	-0.002** (0.001)	0.001* (0.000)
Agr	-0.005*** (0.001)	-0.001 (0.001)	-0.001 (0.001)
Exp	0.001* (0.000)	0.001*** (0.000)	0.000 (0.000)
Constant	2.353*** (0.165)	2.564*** (0.117)	0.935*** (0.059)
Observations	1544	1823	1666
Instruments	90	90	90
Groups	93	100	96
AR(2)	0.106	0.141	0.555
Hansen	0.576	0.521	0.558

Note: Pr. AR(2) and Pr. Hansen denote the p-values of Arellano and Bond's (1991) test for second-order autocorrelation in first-differenced residuals and Hansen's (1982) test for the over-identification of instruments, respectively. Significance Codes: *** : 0.01; ** : 0.05; * : 0.1.

Chapter 2

The Effect of Institutional Quality on Tax Revenue via the FDI Transmission Channel

Many studies have explored how the quality of the institutional environment affects tax revenue, but they often produce mixed results, making it challenging to develop effective policies. This study addresses these inconsistencies by incorporating foreign direct investment (FDI) inflows as a mediating factor. It analyzes unbalanced panel data from 136 countries, including developed, developing, and emerging markets, spanning from 1990 to 2017. Firstly, using a mediation framework with structural equation modeling (SEM), our analysis reveals a positive relationship between institutional quality and tax revenue, suggesting that stronger institutions lead to higher tax revenues. Additionally, it finds that cultural and political stability, as well as favorable economic conditions, increase tax revenue by attracting or enhancing FDI in the host country. Among the various factors, institutions have the most substantial direct impact on tax revenues, although their indirect effect through FDI is less significant compared to the influence of economic conditions and political stability.

Secondly, the impact of FDI on tax revenue is most pronounced in middle-income countries and high-income countries. In contrast, low-income countries experience minimal direct and mediating effects which may be due to extensive tax incentives, which can distort resource allocation and encourage tax evasion.

Keywords: Tax revenue, Foreign Direct Investment (FDI), SEM, Institutional quality environment, income levels, global panel, composite index of governance.

JEL: E6,H3,O1

2.1 Introduction

After having examined the effects of corruption on tax revenue, we explore in this chapter the link between institutions, FDI, and tax revenue. International frameworks argue that low-income countries should raise more domestic revenue by increasing their tax-to-GDP ratios. The Addis Ababa Action Agenda (2015) and the 2030 Agenda for Sustainable Development identify domestic resource mobilization as the most stable and sustainable source of development finance. Although the Third International Conference on Financing for Development rejected a formal duty to reach a 20% tax-to-GDP ratio, the idea of a minimum floor persists, with 15% of GDP now widely cited as a basic benchmark.

In recent years, many studies have highlighted the central role of institutions in the mobilization of tax revenues. As shown by theoretical studies of North (1990) and later by ‘(Acemoglu, Johnson, and Robinson 2001; Ross 2004; Acemoglu, Johnson, and Robinson 2005) and empirical studies (Mauro 1995; Ghura 1998; Méndez and Sepúlveda 2006; Phuong 2015; Syadullah 2015; Arif and Rawat 2018), institutional quality is a fundamental determinant not only of economic growth but also of fiscal performance. Countries with inclusive, credible, and stable institutions are better able to mobilize domestic resources and reduce their reliance on external financing.

At the same time, according to multiple studies, FDI has the potential to affect tax revenue in a variety of ways, both positively and negatively. Several mechanisms can influence the relationship between FDI and tax revenue, and empirical studies have investigated the impacts of FDI on tax revenue in different contexts. One potential positive impact of FDI on tax revenue is through job creation and economic activity. FDI can increase investment, production, and exports, leading to increased economic growth and higher tax revenue from income, sales, and value-added taxes. Moreover, FDI can introduce new technologies, managerial skills, and knowledge spillovers that can enhance productivity

and competitiveness, leading to higher corporate profitability and increased corporate tax revenue. The institutional and policy context of the host country also plays a crucial role; factors such as corruption levels, governance quality, and tax administration effectiveness can influence the government's ability to collect taxes from FDI (Tanzi and H. R. Davoodi 2000; Attila, Chambas, and Combes 2009; Camara 2019). On the other hand, studies as (Gregorio and Lee 2002; Bayar and Ozturk 2018) found that FDI affects tax revenue negatively. Gregorio and Lee (2002) explain this effect by the fact that FDI can erode tax revenue through three channels: a narrower tax base (exemptions, BEPS), lower effective tax rates (tax competition, stabilization clauses), and weaker compliance (evasion, treaty shopping, limited enforcement). Economic activity may rise, but the tax yield lags or falls. This study therefore suggests integrating tax-evasion risks into incentive design, establishing monitoring and evaluation, and prioritizing non-tax measures like infrastructure, regulatory simplification, institutional quality to attract FDI to EU countries. These studies and observations raise a crucial question: Do institutions increase tax capacity partly by attracting FDI that is taxed more effectively? How does this effect operate in low- and middle-income countries?

To our knowledge, no study tests whether FDI mediates the relationship between institutions and tax revenue. Most work treats the links separately, focusing either on institutions and tax revenue or on FDI and tax revenue, with little attention to institutional quality as a channel.

This chapter fills that gap with an empirical study of the institutions-FDI-tax nexus. We build three sub-indices and one aggregate index of institutional quality using principal component analysis, covering the institutional environment, economic conditions, and political-cultural stability. We use structural equation modeling (SEM) to estimate the direct effects of institutional quality on FDI and tax revenue and the potential mediating role of FDI. For robustness, we re-estimate with OLS, SUR, and GMM, split the sample into country groups, and analyze disaggregated tax data. The dataset covers 136 countries from 1990 to 2017.

Results show a positive association between institutional quality and tax revenue. Cultural and political stability and favorable economic conditions raise tax revenue in part by attracting or expanding FDI. Institutions exert the largest direct effect on tax revenue, while their indirect effect through FDI is present but smaller than the channels linked to economic conditions and political stability.

Policy implications are clear. Strengthen institutional quality across income levels. Improve economic conditions and maintain political and cultural stability to attract FDI that can be taxed effectively. In low-income countries, design targeted tax incentives and implement VAT best practices to increase revenue while avoiding export distortions and tax avoidance.

Structure of the chapter. Section 2 reviews the theoretical and empirical literature on institutions, FDI, and tax revenue. Section 3 presents the data and descriptive statistics. Section 4 sets out the empirical strategy. Section 5 reports results. Section 6 provides robustness and heterogeneity analyses. Section 7 concludes.

2.2 Literature review

2.2.1 Literature on institutional quality

North (1990) argues that strong institutions play a critical role in shaping economic activities by lowering costs associated with transactions, manufacturing, and production. Institutions of high quality also reduce business costs, which in turn boosts profitability. In contrast, markets characterized by weak institutions require greater resources and time for monitoring. When property rights are inadequately protected and contract enforcement is unreliable, the associated risk premium rises, leading to slow economic activity. This elevated risk deters international investors from committing to such environments. On the other hand, a low-risk environment with robust institutions is more appealing to investors, leading to more effective utilization of foreign direct investment.

According to Dunning (1998) and his OLI (Ownership, Location, Internalization) framework, FDI decisions are influenced by opportunities to enhance market power through ownership of production processes, advantages of location, and the ability to internalize externalities, with a strong emphasis on the impact of institutional factors on these key determinants. Dunning and Lundan (2008) further elaborate by incorporating North's institutional theory, suggesting that FDI is influenced by factors such as market size, availability of natural and human resources, efficiency, and the quality of institutions in the host country. This relationship can be modeled algebraically, where FDI is a function of market size, macroeconomic stability, and institutional quality. In this context, FDI stands for foreign direct

investment, market size often measured by GDP per capita is a crucial determinant, and macroeconomic stability, which affects FDI, is typically assessed through the exchange rate.

Theoretical literature generally supports the idea that institutional quality positively impacts economic growth (North 1990; King and Levine 1993; Knack and Keefer 1995; Mauro 1995; Acemoglu and Verdier 1998; Ali, Fiess, and MacDonald 2010). Nonetheless, research examining the influence of institutional quality on FDI, especially in relation to legal structures, property rights enforcement, corruption control, and governance, has produced varied outcomes. Some studies reveal that weak institutions are negatively associated with FDI (Bénassy-Quéré, Coupet, and Mayer 2007; Buchanan, Le, and Rishi 2012).

Numerous panel data analyses have explored different aspects of institutional quality, yielding diverse conclusions about their significance. A few significant studies indicate a positive correlation between institutional quality and FDI. For instance, research by Saidi, Ochi, and Ghadri (2013) indicates that political stability and regulatory quality can positively influence FDI inflows, while Staats and Biglaiser (2012) highlight the importance of rule of law and judicial strength as key determinants of FDI inflows. Conversely, other studies utilizing panel data analysis have found certain institutional factors to be statistically insignificant in attracting FDI. For example, Bayar and Alakbarov (2016) discovered that control of corruption and rule of law did not have a statistically significant effect on FDI inflows. Mádr, Kouba, et al. (2015) examined the political environment's influence including the quality of democracy, political instability, and corruption on FDI inflows in emerging markets, concluding that the impact of the political environment on FDI is not straightforward, although political instability was found to be statistically significant. Abdella, Naghavi, and Fah (2018) found that corruption had no statistically significant impact on FDI flows in BRICS countries (Brazil, Russia, India, China), whereas trade openness and political stability were significant. Additionally, Peres, Ameer, and Xu (2018) investigated the impact of institutional quality, as measured by corruption control and rule of law indicators, on FDI in developing countries. Their research suggests that while institutional quality significantly affects FDI in developed countries, it is not a significant factor in developing countries, likely due to weaker institutional frameworks.

Despite the fact that there is a vast literature on the impact of institutional quality on FDI, the impact of FDI on institutional quality is a relatively unexplored topic in the existing literature. The impact of FDI on institutional quality is a complex and multifaceted issue, and the relationship between the two is subject to debate among scholars and policymakers. Some argue that FDI can have a positive impact on political environment, while others suggest that FDI can increase political risk in host countries. According to this view, FDI can increase economic growth, create jobs, and stimulate technological innovation, which can help to reduce social and political tensions and promote stability (Javorcik 2015). FDI can also contribute to the development of institutions, such as the legal and regulatory frameworks, that can help to reduce political risk.

On the other hand, some scholars suggest that FDI can increase political risk in host countries. For example, multinational corporations may engage in corrupt practices or attempt to influence government policies to favor their own interests, which can undermine democratic processes and contribute to political instability (Wilson and Baack 2012). Furthermore, multinational corporations may engage in practices that are harmful to the environment or violate human rights, resulting in social and political unrest (Henisz and Zelner 2001). Dang (2013) found a positive relationship of the impact of FDI on institutional quality in Vietnam using data from 60 provinces. According to the findings of his research, foreign direct investment (FDI) has the potential to stimulate institutional and domestic transformation while also fostering regional convergence. However, the Vietnamese experience does not necessarily imply that the effect of the FDI would be the same in other countries.

2.2.2 Literature on Foreign direct investment

According to multiple studies, foreign direct investment (FDI) has the potential to affect tax revenue in a variety of ways, both positively and negatively. Several mechanisms can influence the relationship between FDI and tax revenue, and empirical studies have investigated the impacts of FDI on tax revenue in different contexts. One potential positive impact of FDI on tax revenue is through job creation and economic activity. FDI can increase investment, production, and exports, leading to increased economic growth and higher tax revenue from income, sales, and value added taxes. Moreover, FDI can introduce new technologies, managerial skills, and knowledge spillovers that can enhance

productivity and competitiveness, leading to higher corporate profitability and increased corporate tax revenue.

Foreign direct investment (FDI) can have complex implications for tax revenue, with both positive and negative effects depending on various factors. One significant concern is tax avoidance strategies employed by multinational corporations (MNCs), such as transfer pricing and thin capitalization, which can lead to profit shifting from high-tax to low-tax jurisdictions, thereby reducing tax revenues in host countries. Additionally, governments often offer tax incentives or holidays to attract FDI, further impacting tax revenues from foreign investors (Zee, Stotsky, and Ley 2002). The institutional and policy context of the host country also plays a crucial role; factors such as corruption levels, governance quality, and tax administration effectiveness can influence the government's ability to collect taxes from FDI (Tanzi and H. R. Davoodi 2000; Attila, Chambas, and Combes 2009). Similarly, the design and implementation of tax policies, including tax rates, exemptions, and treaties, shape foreign investors' behavior and their contribution to tax revenue Okey (2013).

Research findings provide nuanced insights into the relationship between FDI inflows and tax revenue across different countries. Mahmood and Chaudhary (2013)'s study in Pakistan, using time series data from 1972 to 2010, found a positive correlation between FDI inflows and tax revenue as a percentage of GDP. Aslam (2015) observed a similar positive impact in Sri Lanka from 1990 to 2013, establishing a unidirectional relationship from FDI to tax revenue. Odabaş (2016) studied European Transition Economy countries from 1996 to 2012 and concluded that FDI inflows stimulate tax revenue with a single causal direction. In contrast, research in Ethiopia by Jeza, Hassen, and Ramakrishna (2016) covering 1974 to 2014 revealed predominantly negative effects of FDI on tax revenue, particularly affecting indirect tax, corporate income tax, and personal income tax.

Conversely, Bayar and Ozturk (2018) conducted a study across OECD countries and found mixed effects of FDI on tax revenue. While they identified a one-way causality effect between FDI inflows and total tax revenue using panel data, at the aggregate level, FDI inflows showed no significant impact on total tax revenue. However, when examined individually for OECD member countries, the results varied significantly. Countries like the United States, the United Kingdom, Iceland, and Sweden benefited

from FDI in terms of tax revenue, while Austria, Italy, Poland, and France experienced reductions in tax revenue due to FDI.

Regarding the reverse causality direction, Tax policies play an important role in determining a country's attractiveness to foreign investors. The impact of tax revenue on foreign direct investment (FDI) has received a lot of attention in academic circles. It is argued that tax policies can have a significant impact on FDI inflows by influencing expected returns on investment and the overall investment environment. High tax rates can raise the cost of doing business for foreign investors, lowering the expected return on investment and making the country less appealing to invest in. Furthermore, complex tax systems can create uncertainty and increase compliance costs for foreign investors, reducing their willingness to invest even further. Lower tax rates and a simpler tax system, on the other hand, can increase a country's attractiveness to foreign investors. Lower taxes can increase the expected return on investment and make it more appealing to invest in that country by reducing the tax burden. Furthermore, a simple and transparent tax system can create a more predictable investment environment for foreign investors, reducing uncertainty and compliance costs (Blonigen 2005; Buettner and Ruf 2007), but from the existing empirical evidence, There is only one-way direction causation between FDI and tax income, which is the sole convergence finding from the earlier research.

2.2.3 Literature on Tax revenue

Finally, we discuss the literature linking institutional quality tax revenue. The first school of thoughts considers the institutional quality, and tax revenue relation, where the causal link goes from institutional quality to tax revenue. The idea is that good institutions lead to more efficient tax regulations and systems that enhance tax collection. Countries with higher institutional quality tend to have more effective and efficient tax administration systems. These systems are better equipped to collect taxes and enforce tax laws, leading to higher levels of tax revenue. In addition, Countries with higher institutional quality tend to have stronger rule of law and control of corruption, which reduces the opportunities for tax evasion. This leads to higher levels of tax compliance among taxpayers. It can also be more attractive to foreign investors, as they provide a more stable and predictable business environment, have

greater public trust in government institutions, including tax authorities. This could potentially stimulate economic activity and result in higher tax revenue.

In this context, many empirical studies have examined this type of relationship (see Hussain, Ilahi, et al. (2016); Phuong (2015); Syadullah (2015); Arif and Rawat (2018); Méndez and Sepúlveda (2006); Ajaz and Ahmad (2010)).

Regarding studies on effects of conflicts, they still few. Ndoricimpa (2021), in his study finds that taxes on goods and services are found to be negatively associated with civil conflicts in Burundi. Same results was found by Mueni, Wawire, and Onono (2021) in his study on Kenya. The authors investigate that Bureaucracy quality, democratic accountability, GDP per capita and all led to increase in tax revenue, while dependency ratio, inflation and internal conflict lead to decline in tax revenue.

On the other hand, the second school of thought is the institutional quality tax revenue relation where the causal link goes from tax revenue to institutional quality, whereby tax revenue leads to an improvement in institutional quality. The explanation for this relationship is that higher tax revenues provides the government with the needed resources to develop the institutions of governance in their countries. However a relatively small number of studies have explored the effect of tax revenues on institutional quality. A study by Bhattacharyya and Hodler (2010), found that higher tax revenue from natural resources can lead to improvements in institutional quality, particularly in the area of democracy and corruption control. The authors argue that natural resource revenue can be used to fund public goods and services, which can in turn lead to improvements in institutional quality. Also, Gregorio and Lee (2002) found that higher tax revenue can lead to improvements in institutional quality, particularly in the area of education. They argue that increased tax revenue can be used to fund education programs, which can in turn lead to higher levels of human capital and economic development.

2.2.4 Literature gaps

Although prior studies have examined tax-revenue issues, important gaps remain. First, most work isolates single dimensions of institutional quality and rarely uses composite indicators. Second, to the best of our knowledge, no study models FDI as a mediating channel between institutional quality

and tax revenue, leaving the transmission mechanism underexplored. Finally, systematic comparisons across income groups are scarce in this topic.

2.3 Stylized Facts

This section presents some stylized facts concerning dependent, explanatory variables and institutional quality indicators are shown in Table 2.1 and 2.2. In our study, FDI inflows (% of GDP) is used as a dependant variable. In some instances, FDI could be negative such as the value of disinvestment by foreign investors was more than the value of capital newly invested in the reporting economy. Luxembourg is the top country by average of FDI, net inflows(% of GDP) among 136 countries .During the period 1990-2017, the average of FDI, net inflows (% of GDP) in Luxembourg was 32.00%. The top 5 countries also include Luxembourg, Liberia, Netherlands, Ireland and Malta. However, Japan, Haiti,Bangladesh,Syrian Arab Republic and Kuwait present the 5 countries with lowest average values of FDI, net inflows(% of GDP) with an average lower than 1% of GDP.

Figure 2.1 depicts the cross-country correlation of average total tax revenues and average FDI as percentage of GDP. The country's average are computed between 1990 and 2017. Average FDI ranged between a minimum close to zero and a maximum close to 10% GDP (to ave these values, we dropped negative values and huge values). At the same time, average total tax revenue % GDP is already above zero for all countries of the sample. The preliminary unconditional correlation between total tax revenue and FDI shows a positive contemporaneous link . This tentatively suggests that on average FDI may have exercised a positive impact on collected taxes. Nevertheless, this serves as initial evidence of a potential positive link between FDI and taxes outcomes. It does not consider important factors like controls for time and country dimensions, other observable explanatory variables as market size, inflation,exchange rates,infrastructure and trade, and it relies on contemporaneous data. These limitations will be addressed in our empirical analysis.

Figure 2.2 plots the average FDI to GDP ratio across countries for the years between 1990 and 2017. The average FDI as a percentage of GDP increased over time, thus aligning with global trends of financial account liberalization and policies promoting economic openness. The average global picture

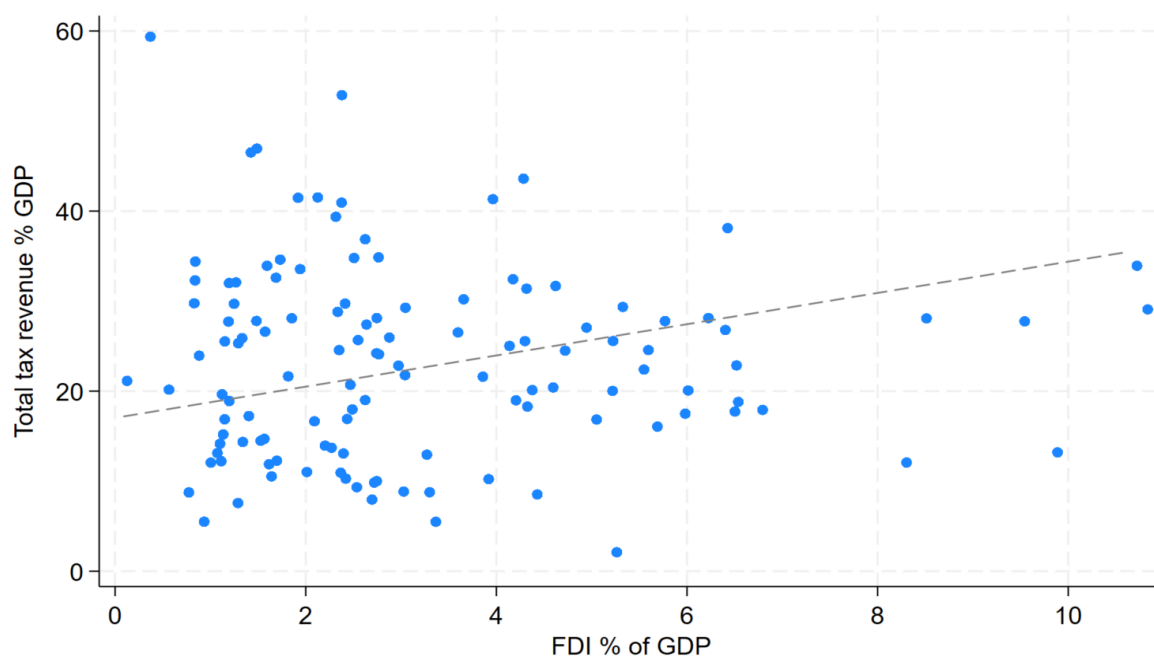


Figure 2.1: FDI and Tax revenue- country averages 1990-2017
 Source: Authors' calculations based on UNCTAD data and GRD UNI-WIDER data

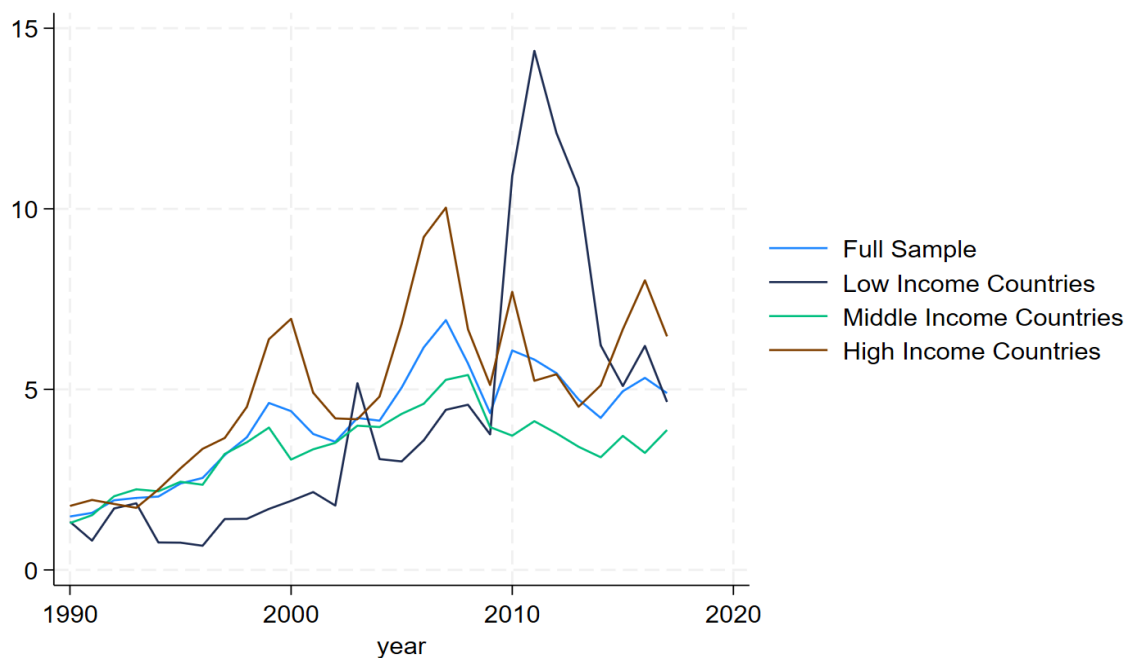


Figure 2.2: FDI as % of GDP- average by country income group

Source: Authors' calculations based on UNCTAD data

Note: The definition of income groups is based on World Bank classifications. For this representation, the lower-middle and upper-middle income groups have been combined into a single middle-income group.

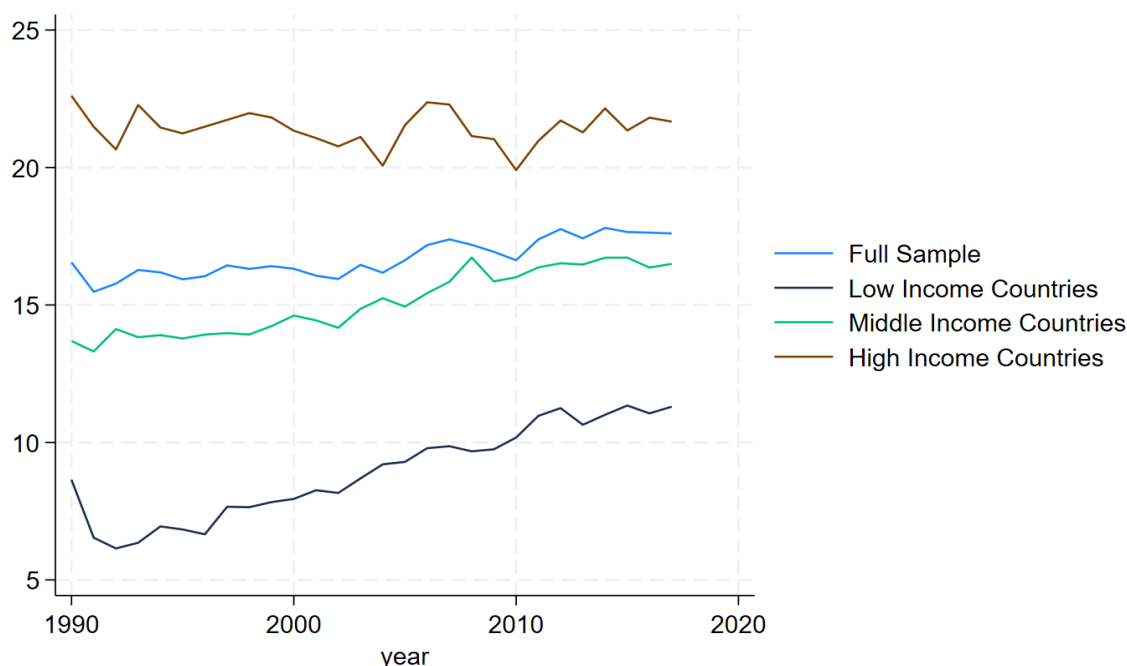


Figure 2.3: Tax revenue % GDP-average by country income group

Source: Authors' calculations based on GRD UNI-WIDER data. Note: The definition of income groups is based on World Bank classifications. For this representation, the lower-middle and upper-middle income groups have been combined into a single middle-income group.

conceals varying patterns across different country income groups. The classification of countries into low, middle, and high income categories follows the World Bank classification. Specifically, the three groups of countries showed a similar pattern until the second half of the 1990's. In contrast, high-income countries have experienced higher levels of FDI than the other groups since the late 1990s. Additionally, FDI in high-income countries has exhibited more pronounced fluctuations during crisis periods, such as the early 2000s dot-com Bubble, the 2008 global financial crisis, and the subsequent great recession. Overall, the level of FDI as a % of GDP has steadily increased in low-income countries, eventually reaching levels comparable to those of other country groups. Figure 2.3 Illustrates the change in total tax revenue as a percentage of GDP over time for each income group. Based on this trend and the data utilized, low-income countries (LICs) consistently generated significantly lower tax revenues relative to GDP compared to middle-income and high-income countries in every year since 1990. Between 1990 and the global financial crisis of 2007, tax revenues in middle-income and low-income countries grew



Graphs by Income groups

Figure 2.4: Principal component Governance across country income groups-average across all countries

Source: Authors' calculations on ICRG and based on WDI-World Bank data

Note: The original institutional quality indicators range between a minimum 0 and a maximum of 12 moving from weak to strong institutional quality. The indicators in this chart are regenerated with principal component analysis. The averages refer to the period 1990-2017

more rapidly than those in high-income countries, whereas revenues in high-income countries declined between 2007 and 2010.

We also utilized institutional quality variables, specifically First group "institutions" includes : Law and order, democratic accountability, bureaucratic quality and corruption. The second "Tensions and conflicts" includes: Internal conflicts, external conflicts, religious tensions and ethnic tensions. The third "economic conditions" includes : government stability, socio-economic conditions, military in politics and investment profile and finally a fourth one that encompass all. These variables are sourced from ICRG indicators, with data starting from 1990-2017. The original institutional quality ranges from a minimum of 0 to a maximum of 12, reflecting low to high institutional quality. Figure 2.4 illustrates the average PCA institutional quality moving from low to high income countries. Nevertheless, differences

in the scale and, therefore in institutional quality exists between indicators within each simple income group

2.4 Data and Estimation strategy

The analysis comprises the period 1990–2017 ¹ for an heterogeneous unbalanced panel of 136 countries of developing and developed countries. Our sample is determined by the intersection of data availability across the main sources used in the analysis. In our study, we used several variables to explain the linkage among institutional quality, FDI, and tax revenues. Our data on total tax revenue and the various types of taxes are obtained from UN-WIDER (World Institute for Development Economics Research). Institutional quality indicators are derived from the International Country Risk Guide (ICRG) provided by the Political Risk Services (PRS) Group. Explanatory variables are derived from WDI-World Bank.² We generate four composite governance indices using the principal component analysis method (PCA). Countries were retained only if they had a minimum number of valid yearly observations for both the dependent and key explanatory variables over the period studied (see Appendix E table 2.18).

In the following regressions, FDI net inflows as a percentage of GDP will be used as the dependent variable of the first empirical model. FDI data were taken from the UNCTAD FDI database (UNCTAD, 2021). Regarding explanatory variables, market size is indicated by GDP per capita, as it reflects the purchasing power of people in host countries (Tintin 2013) . Foreign investors prefer a larger market size for investment because a larger market size is expected to have a higher degree of development and higher per capita income (Cuyvers et al. 2011). In general, we expect market size to be positively related to FDI inflows. However, Asiedu (2002) found that market size was not a significant determinant of FDI inflows. Another determinant that may impact FDI inflows is trade openness, which is measured by the ratio of imports and exports to GDP. It's widely accepted that greater openness to trade creates investment opportunities and reinforces the link between domestic and international markets (Tintin

¹The 1990–2017 period was chosen because it offers the widest and most consistent data coverage across UNU-WIDER, UNCTAD, and ICRG.

²All variable definitions and data sources are presented in the Appendix D tables 2.15, 2.16 and 2.17

Table 2.1: Descriptive Statistics (Dependent and Independent Variables)

Variable	Obs	Mean	Std. dev.	Min	Max
Total tax revenue	2,169	16.915	6.785	0.000	54.069
Non-Resource taxes	2883	15.887	7.823	0.085	36.932
Non-Resource indirect taxes	2774	9.316	4.071	0.017	26.535
Taxes on G and S	3,005	7.549	4.177	0.000	19.329
FDI	3,395	4.178	7.044	-15.707	103.337
GDP per capita growth	3,305	2.175	4.736	-64.992	49.480
Inflation	3,159	28.249	231.282	-10.067	7481.664
Openness	3,166	79.452	48.554	0.544	437.326
Agriculture	3,189	12.314	12.268	0.030	79.042
Real_eff_exchange rate (REER)	2,004	100.556	25.475	32.674	510.903
Mobile subscription	3,388	49.878	51.537	0.000	212.639

2013). Infrastructure is also considered an important determinant of FDI. Host countries with good infrastructure attract more FDI inflows, as it signifies efficient business operations in the host country, according to Tsen (2005). There are various proxies through which we can measure infrastructure. In this analysis, we will use mobile cellular subscriptions per 100 people. Kinoshita and Campos (2004) argued that the availability of telephone lines represented the relationship between home and host countries. Furthermore, One important factor frequently mentioned in relation to FDI is the exchange rate. According to the exchange area theory, international companies are less likely to invest in a country where their currency is weaker. This theory's central premises is that there is a bias in the capital market. It is assumed that this bias results from the fact that an income stream originating from a weak currency nation is linked to exchange rate risk, which causes the market to capitalize the income stream at a higher rate when it is owned by a weak currency firm (Aliber 1970). All the data are related to macroeconomic variables. GDP per capita, Real exchange rate, Mobile subscriptions, and trade openness are collected from the World Development Database (World Bank 2021).

Control variables used in the second equation are those that have been identified as important determinants of tax revenue in the literature, including GDP per capita, the share of agriculture in GDP, the degree of openness of the economy, and the inflation rate. An important explanation in the case of

Table 2.2: Descriptive statistics (Governance indicators)

	Obs	Mean	Std. dev.	Min	Max
Government stability	3710	7.855	1.917	0.666	12
socio-economic conditions	3710	5.601	2.340	0.000	11
Investment profile	3710	7.707	2.436	0.000	12
Internal conflicts	3710	9.059	2.162	0.000	12
External conflicts	3710	9.948	1.661	0.000	12
Corruption	3710	2.873	1.289	0.000	6
Military	3710	3.807	1.785	0.000	6
Religious tensions	3710	4.598	1.298	0.000	6
Law and order	3710	3.741	1.402	0.000	6
Ethnic tensions	3710	4.006	1.345	0.000	6
Democratic accountability	3710	3.898	1.661	0.000	6
Bureaucracy quality	3710	2.182	1.140	0.000	4
Political stability WGI	2764	-0.085	0.954	-3.314	1.760
Economic freedom index	2290	6.662	1.126	2.719	8.919

GDP per capita is that the higher the GDP per capita, the higher the level of development, which in turn leads to a greater ability to pay and collect taxes (Chelliah 1971; Sen Gupta 2007; Baunsgaard and M. Keen 2010). Several studies, such as Chelliah (1971) and Sen Gupta (2007), have considered the value added of agriculture (% GDP) as one of the important conventional explanatory variables. Empirical evidence indicates that this sector is difficult to tax because of the large share of subsistence agriculture. This could also be seen as one of the main reasons for the low tax-to-GDP ratio in developing countries. Increased trade openness can have nuanced effects on government tax revenues, illustrating both potential benefits and challenges. On one hand, greater trade openness measured by the ratio of the sum of imports and exports to GDP can enhance government revenues, particularly in developing countries where trade taxes historically contribute significantly to state budgets. The tracking of exports and imports at designated entry and exit points helps minimize opportunities for tax evasion, thus potentially increasing tax collection (Sen Gupta 2007; Baunsgaard and M. Keen 2010). This systematic recording of trade transactions allows governments to capture revenue more effectively, contributing to higher tax receipts. Conversely, increased trade openness can also lead to a reduction in tax revenue, especially through

decreased earnings from international trade taxes. As economies become more open, the reliance on traditional trade taxes such as tariffs diminishes, which can erode overall tax revenue. This reduction occurs because lower tariffs and reduced trade barriers are often implemented as part of broader trade liberalization efforts. Consequently, while trade openness can stimulate economic growth and broaden tax bases, it can simultaneously diminish specific revenue streams, such as those from international trade taxes (Gnangnon and Brun (2019)). Economic stability in a country is influenced by the inflation rate. A stable macroeconomic environment means less investment risk, which supports development and can lead to higher tax revenues. Conversely, if the economic situation worsens, tax revenues typically decrease. According to Tanzi and Davoodi (1997), during inflation, if real tax payments lag behind taxable transactions, tax obligations are lower in real terms when taxes are paid. Additionally, taxes on specific goods like tobacco, alcohol, and gasoline might be set at fixed rates that do not adjust with inflation (Tanzi 1998).

Ghura (1998) also argues that high inflation can reduce the tax base because people may protect their wealth from inflation's negative effects by investing in less-taxed assets, such as livestock, or by delaying investment plans. Overall, the gap in tax revenues can widen with inflation. However, despite significant research on inflation's impact on tax performance, the phenomenon can be complex. Governments rarely adjust tax thresholds for inflation, but individual income tax and national insurance contributions usually rise with increasing wages. This means inflation often pushes more people into higher tax brackets. Moreover, if inflation is moderate and stable, business profits generally rise with the economy's inflation, suggesting that corporate tax revenues also increase with inflation. This figure 2.5 plots the relationship between the average ratio of foreign direct investment (horizontal axis) and the average ratio of tax revenue to GDP (vertical axis) for all countries during the period under study. We observe a positive correlation between these two ratios. We can also identify two outliers: Luxembourg (LUX) and Liberia (LBR).

tensions and ethnic tensions. The third and the last group includes government stability, socio-economic conditions, military in politics and investment profile.

Secondly, we apply KMO measure of sample adequacy for our 3 variable groups to justify the use of PCA. $KMO(1) = 0.789 > 0.5$, $KMO(2) = 0.736 > 0.5$ and $KMO(3) = 0.675 > 0.5$. The KMO test in PCA for the 3 groups of variables shows that the KMO index is higher than 0.5. Then, we obtained 4 components for each group with calculated eigenvalues corresponding to 4 original variables each one. As recommended by Kaiser's rule, we retain only first components with eigenvalues exceeding 1, their values as follows: $\lambda = 2.766 > 1$, $\lambda = 2.40 > 1$ and $\lambda = 2.32 > 1$

2.4.2 Non recursive Model

Based on the above discussion in section 2, our study focuses on the relationship between institutional quality and FDI, as well as the importance of institutional development on government tax revenue. We suppose having paths in both directions between (3) (2) and (1). We develop a non recursive model under SEM. simultaneous equation model based on the combination of equation (1), (2) and (3) as shown below

$$TAX_{it} = a_0 + a_1 CGI_{it} + a_2 FDI_{it} + \sum \alpha_i X_{it} + \mu_{it}, \quad (2.1)$$

$$FDI_{it} = b_0 + b_1 CGI_{it} + b_2 Tax_{it} + \sum \beta_i Y_{it} + \omega_{it}, \quad (2.2)$$

$$CGI_{it} = c_0 + c_1 FDI_{it} + c_2 TAX_{it} + \sum \gamma_i Z_{it} + \phi_{it} \quad (2.3)$$

The endogenous explanatory variables are dependent variables from other equations in the system. We suppose having paths in both directions between institutional quality³, tax revenue and FDI. So we develop a non recursive model under SEM. Control variables for equation (1): Agriculture, Inflation, Openness, GDP per capita .

Control variables for equation (2): real exchange rate, Openness, GDP per capita growth, Mobile subscription

³CGI:is a composite governance index constructed by principal component analysis method: see section 2.5.1

Control variables for equation (3): Democracy, ethnic fragmentation, linguistic fragmentation, religious fragmentation.

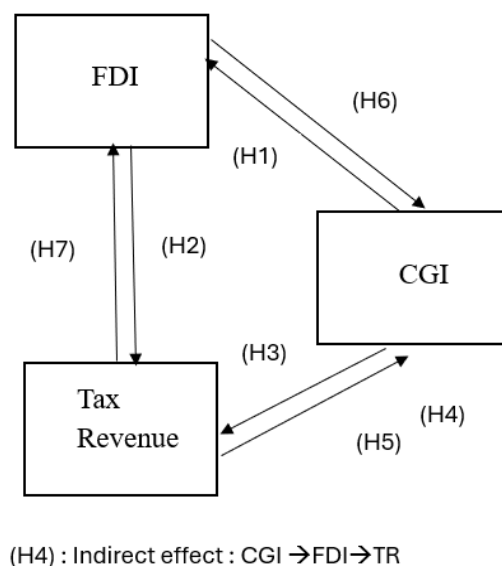


Figure 2.6: Expected relationships from literature and found results
Source: Authors' construction

2.4.3 Recursive model: Mediation model

The mediating effect on panel data is examined in this study. Research on panel data mediating effects are still rare. Lack of information in citations concerning the techniques employed to evaluate the mediating impact is probable cause in the panel data. Nevertheless, this does not mean that it is not possible to assess the mediating impact on panel data. Bauer, Preacher, and Gil (2006) state that despite a number of weaknesses it is still feasible to test the mediating impact on the random effect model. The low confidence interval in cases when the data is not normally distributed is one of these weaknesses. Several studies, like those by Wahba and Elsayed (2015) and Rozen-Bakher (2017), estimate the mediating effect using panel data by following the Baron and Kenny (1986) method. However, they use different approaches to test this effect. Wahba and Elsayed (2015) use the bootstrapping method and the Sobel

test, while Rozen-Bakher (2017) uses hierarchical regression. According to Baron and Kenny (1986), there are three steps to conduct a mediation analysis:

First Step: Regress the independent variables on the mediator variables (path a).

Second Step: Regress the mediator variables on the dependent variable (path b).

Third Step: Regress the independent variables on the dependent variable (path c).

These steps can be simplified into two main parts. The first part is as follows:

$$FDI_{it} = a_0 + a_1 CGI_{it} + \sum \beta_i Y_{it} + \varepsilon_{it}, \quad (2.4)$$

Where FDI denotes the Foreign Direct Investment net inflows as a percentage of GDP. IQ is used to measure the institutional quality of country *i* at time *t*. *Y* includes various control variables, and a_0 represents a constant in the equation, a_1 represents the regression coefficient of independent variable IQ, while β_i are the regression coefficients of each control variable, and ε_{it} is the error terms. Equation (1.4) estimates the effect of institutional quality (IQ) on Foreign Direct Investment (FDI), referred to as path a. Paths b and c in this study are represented in substructure 2 as follows:

$$TAX_{it} = b_0 + b_1 CGI_{it} + b_2 FDI_{it} + \sum \alpha_i X_{it} + \mu_{it}, \quad (2.5)$$

Where TAX is the value of total tax revenue % of GDP of each country *i* at time *t*. In this case CGI and FDI are explanatory variables. As for b_0 =constant, b_1 represents the regression coefficient of independent variable CGI, b_2 represents the regression coefficient of independent variable, while α_i are the regression coefficients of each control variable, and μ_{it} =error terms. This study will test four hypotheses from the above equations. The first substructure hypothesis that IQ affect FDI (H1). Meanwhile, from the second substructure, this study will examine the effect of FDI on tax revenue(H2) and the direct effect of CGI on tax revenue(H3). In addition , this study will also examine the indirect effect of IQ on tax revenue (H4). The procedure to examine the mediating role of FDI in this study is the Sobel test. The equation for the Sobel test is as follows:

$$Z = \frac{a_1 \cdot b_2}{\sqrt{(b_2^2 \cdot SE_{a_1}^2) + (a_1^2 \cdot SE_{b_2}^2)}}$$

Where Z is the Sobel statistic value which refers to the mediating effect coefficient. Meanwhile, a_1 is the regression coefficient of the independent variable on the mediator. At the same time, b_2 is the regression coefficient of the mediator variable to the dependent variable. Then, SE_{a_1} is the standard error resulting from the regression coefficient of the independent variable to the mediator, and SE_{b_2} is the standard error of the regression coefficient of the mediator to the dependent variable. There are two types of mediating relationships: complete and partial. Complete mediation occurs when path a and path b are significant, but path c is not. Meanwhile, partial mediation occurs when all three paths :path a , path b , and path c are significant. In contrast, complete mediation happens when the independent variable influences the dependent variable solely through its effect on an intermediary variable, with no direct effect remaining. Partial mediation involves both direct and indirect effects of the independent variable on the dependent variable, with the indirect effect operating through the intermediary variable. Following the mediation analysis, we will assess the model based on specific fit criteria. The model is considered well-fitting if the Standardized Root Mean Square Residual (SRMR) value is less than 0.08 and the Critical Difference (CD) is close to 1.

This study argues that because good institutions has an important role in encouraging foreign investment, it contributes to increase tax revenue in host countries. Hence, Figure 2.7 shows that the impact of good governance on tax revenue is not only direct but also indirect mediated via a third variable (M) which is FDI.

2.5 Results

This section presents the results of our estimation. Table 2.3 displays the outcomes of the regression analysis using structural equation modeling for our sample of 136 countries. The findings corroborate previous research highlighting the significance of institutional equality, economic conditions, and political stability in attracting FDI inflows and boosting tax revenue. Specifically, the sub-index incorporating rule of law, democratic accountability, bureaucratic equality, and corruption shows a statistically significant positive relationship with both FDI and tax revenue. Similarly, the political stability sub-index, which includes internal and external conflicts, religious tensions, and ethnic tensions, along with the economic conditions sub-index covering government stability, socio-economic conditions, investment profile, military, and political factors all demonstrate significant positive coefficients with

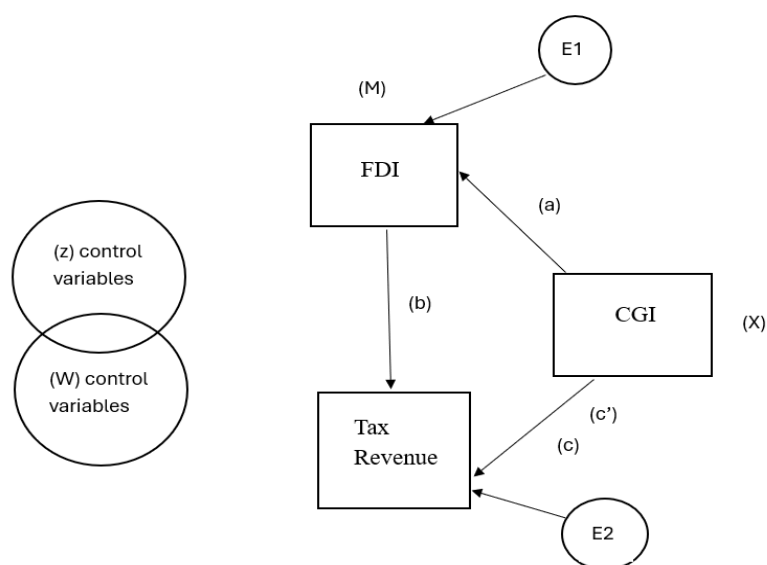


Figure 2.7: Mediation modelling of CGI, FDI and tax revenue.

Source: Authors' construction

FDI and tax revenue. These results align with numerous prior studies on both developing and developed countries (Ajaz and Ahmad 2010; Ali, Fiess, and MacDonald 2010; H. T. T. Nguyen, M. H. Nguyen, Goenka, et al. 2014; Kurul and Yalta 2017; Sabir, Khan, et al. 2018; Camara 2023). The coefficients are all positive and statistically significant, confirming that better institutional quality, stronger political stability, and sound economic conditions contribute to higher FDI inflows and improved tax performance. Specifically, a one point increase in the Composite Governance Index (CGI) leads to a 0.141 percentage point rise in FDI inflows % GDP . the same one-point improvement in CGI raises total tax revenue by 1.266 percentage points of GDP, while FDI itself exerts a smaller but statistically significant positive effect of 0.051 points. Combining both channels gives a total effect of approximately 1.27 percentage points on the tax-to-GDP ratio. This confirms that part of the fiscal impact of institutional quality operates indirectly through FDI, as supported by the positive and significant Sobel Z statistics. Additionally, using structural equation modeling, we employed Baron and Kenny's approach and Sobel's Z test to examine the mediating role of FDI. The results from Sobel's Z-test 2.047*, 2.463**, 2.366** and 2.352**, presented in the same table, indicate that the indirect effect of FDI is notably significant between political

stability, economic conditions, and tax revenue. In contrast, its significance is relatively lower in the relationship between institutions and tax revenue.

In Table 2.4, we divide our sample into three income groups and break down tax revenues into non-resource taxes, non-resource indirect taxes, and taxes on goods and services. Columns (1) to (4) represent Low-Income Countries (LIC), columns (5) to (8) represent Middle-Income Countries (MIC), columns (9) to (12) represent High-Income Countries (HIC), and columns (13) to (16) show results for the full sample. Coefficients for the overall sample are consistently significant and positive. For the full sample, better institutional quality significantly increases both FDI and tax revenues. A one-point rise in the CGI raises FDI by 0.14 percentage points of GDP and total tax revenue by about 1.27 points. The effect is strongest for non-resource and indirect taxes, including taxes on goods and services, which rise by around 1.16, 0.23 and 0.15 percentage points. However, in LICs, the significance is less pronounced compared to the other two income groups. While the effects on disaggregated taxes remain stable in MICs and HICs, LICs show no significant effect of FDI on any type of taxes. Additionally, the CGI does not significantly impact taxes on goods and services or FDI. A one point increase in the Composite Governance Index (CGI) raises non-resource and total tax revenues by about 0.13–0.16 percentage points of GDP, while its impact on taxes on goods and services is statistically insignificant. The effect of CGI on FDI inflows is small, around 0.19–0.22 percentage points of GDP, and becomes insignificant for goods-and-services-related specifications. Sobel's Z test is also non-significant only in LICs, in contrast to MICs and HICs, where FDI plays a partial mediating role in increasing tax revenue due to better institutional quality, economic conditions, and political stability. GDP per capita also shows a positive and significant effect on FDI in high, middle income countries and overall sample, though it is not significant in low-income countries. Trade positively affects FDI across all income groups, with the effect being most significant in high-income countries. These results are in line with findings of Asiedu (2002), Liargovas and Skandalis (2012) and Furceri and Borelli (2008). Additionally, mobile subscriptions per person show a positive and significant relationship with FDI in all income groups, which demonstrate that rapid dissemination of information can attract more FDI. These results are consistent with the study of Sabir, Rafique, and Abbas (2019) and Campos and Kinoshita (2008). The exchange rate negatively impacts FDI in middle-income countries. A higher REER increases the cost of

local goods and services for foreign buyers, potentially reducing the attractiveness of investments in export-oriented industries, as highlighted by Moraghen, Seetanah, and Sookia (2021). However, a higher REER has positive effects on the overall sample of countries. This can be explained by the fact that an appreciated REER can signal economic stability and strong macroeconomic fundamentals, attracting FDI due to perceived lower risk and higher confidence in the economy, which is consistent with the study of Caves (1996). We can explain this result by the fact that high income countries typically have well-developed, efficient, and capable institutions. These institutions are better equipped to implement and enforce tax policies, leading to higher compliance and better tax revenue collection. GDP per capita growth is not consistently significant, indicating its varied impact on tax revenue. Inflation has a small but significant negative effect in low-income and middle-income countries, suggesting that higher inflation slightly reduces tax revenue through the erosion of the tax base, distortion of financial records, tax collection lags, increased evasion and compliance costs, challenges with tax system indexation, impacts on economic growth, and pressures on government spending. All these factors combine to reduce the real value and effectiveness of tax revenue during inflationary periods. Trade has a positive impact on tax revenue in low-income countries. Ghura (1998) revealed the same link in his study. But also trade openness shows negative effects in high-income and overall samples. This negative effect can be explained by the fact of where the proportion of trade openness of GDP is high means reducing tariffs. Several studies have had similar results (Batra and Slottje 1993; Gnangnon and Brun 2019). Finally, the agriculture sector's contribution to tax revenue is mixed, with significant negative effects in low-income and middle-income countries. This confirms that the agricultural sector can be difficult to tax, especially if it is dominated by subsistence farmers, Ghura (1998).

Since tax revenues include revenues from natural resources, such as taxes on mining and oil companies, we have replaced the chosen variable with one that excludes natural resource revenues and another that excludes non resource direct taxes. Our results indicate that good governance and FDI inflows enhance non resource, and specifically non resource indirect tax mobilization, and FDI plays a mediating role between good governance and non resource indirect taxes (see Table 2.4). These findings suggest that strengthening governance and attracting FDI can effectively contribute to increasing indirect tax revenues from non-resource sectors. In addition, we also found a significant positive mediating role

of FDI on taxes on goods and services. The impact of FDI inflows on the tax on goods and services varies based on the orientation of the FDI activities. If FDI is primarily directed towards serving the domestic market, it could boost VAT revenues by increasing the consumption of goods and services. Additionally, higher employment driven by such investments could further raise VAT receipts due to increased consumer spending.

Conversely, if FDI is mainly focused on export-oriented activities, its effect on VAT can be different. Export-oriented FDI might reduce VAT revenues due to the VAT credit issue or potentially increase indirect taxes through higher domestic demand resulting from increased export earnings. For example, higher export revenues could lead to wage increases, which in turn boost domestic consumption and elevate taxes on goods and services. However, capital-intensive export activities could exacerbate VAT credit problems, thereby influencing VAT on goods and services.

The Standardized Root Mean Square Residual (SRMR) and the Coefficient of Determination (CD) provide insights into the model fit. The SRMR values indicate acceptable fit across all models. Because the SRMR is an absolute measure of fit, a value of zero indicates perfect fit. The SRMR has no penalty for model complexity. A value less than 0.08 is generally considered a good fit (Hu and Bentler 1999). and The CD is like an R² for the whole model. A value close to 1 indicates a good fit. The findings from Baron and Kenny approach reveal a scenario of partial mediation in the relationship between institutional quality, FDI and tax revenue in high income countries, all sample and middle income countries. The significant coefficients observed in all three steps of the mediation analysis indicate that institutional quality positively influences both FDI and tax revenue. Specifically, institutional quality has a direct impact on tax revenue, while also indirectly affecting tax revenue through its influence on FDI. This suggests that while IQ directly enhances tax revenue generation, part of its effect is mediated by the attraction of FDI. We have observed that non-significant effect of our three variables of interest are more prevalent in low income countries, although all hypotheses H1, H2, H3 and H4 are all validated in MIC and HIC samples. Hypothesis 2 and Hypothesis 4 are not valid in low income countries with non resource taxes, non resource indirect taxes and taxes on good and services this can due to the weakness of institutions in these countries, non effective tax incentives and weak tax administrations.

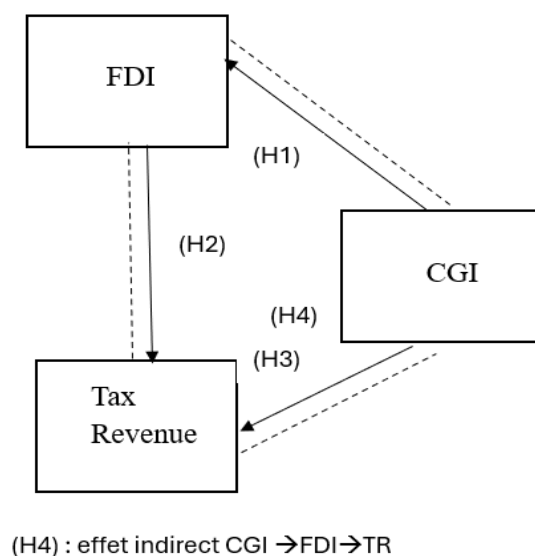


Figure 2.8: Hypotheses validation

2.5.1 Sub-sample heterogeneities.

Given the crucial direct and indirect role of institutional quality environment, economic conditions and political and cultural stability in shaping tax revenue across our overall sample. We analyze in this section the heterogeneity of these effects based on the income level of the countries and by using disaggregated taxes. Specifically, we divide our sample, which includes all the countries we studied, into low income, middle income and high income countries. We then examine the impact of governance and FDI on different tax categories, including total tax revenue, non resource taxes, non resource indirect taxes and taxes on goods and services. In Table 2.4 presents the results regarding the impact of governance on FDI and its influence on tax revenue with tax revenue disaggregated by type across different income level countries. The findings reveal that FDI has a significant and positive effect on tax revenue in MIC and HIC. However, in LIC, the impact of FDI on taxes is not significant. This lack of significance may be attributed to the adverse effects of tax incentives and the involvement of multinational corporations in tax evasion, fraud and avoidance (Ade, Rossouw, Gwatidzo, et al. 2018). As highlighted by Zee, Stotsky, and Ley (2002), "FDI can produce tax revenue losses through the existence of tax incentives, such as free economic zones, where goods are generally exempt from

duties and taxes, corporate taxes are low and zero. First these incentives reduce the tax base. Second, tax incentives distort the allocation of resources for activities that take advantage of tax benefits are favoured at the expense of others. Finally tax exemptions create opportunities for corruption and rent seeking." As mentioned in a paper by IMF staff, OECD, UN AND WORLD BANK; Fund et al. (2015); tax incentives often receive low ratings in investment climate surveys for low income countries, with many examples showing that these incentives are often redundant, that is investments would likely happen even without them. Furthermore, the high cost of these incentives can reduce available funds for important public services like infrastructure or lead to higher taxes on other activities. In fact, VAT exemptions on investments and intermediate purchases can be even more harmful than redundant due to their cascading effects throughout the production chain. Regarding the impact of good governance on FDI, we observe that the impact of governance on FDI is higher in HIC. Multinational corporations consider the quality of governance and economic conditions as crucial factors before making investment decisions. A deterioration in governance can lead to a decrease in FDI flows. In other words, issues such as corruption, political instability or inadequate infrastructure can reduce country's attractiveness to foreign investors Gök (2018). On the other hand, the effect of governance on taxes on goods and services is found to be non-significant in low-income countries. This can be explained by the fact that VAT systems can be complex to administer and comply with in these countries, where governance structures may be weaker. Implementing a complex tax system like VAT can be particularly challenging. Even if governance improvements enhance compliance and enforcement for indirect taxes and non-resource taxes, this may not necessarily lead to better VAT collection. In low-income countries, VAT systems are often characterized by complexity, numerous reduced rates, and non-neutrality of taxes, which complicates their effectiveness and administration. Finally, the mediation role of FDI, of the indirect effect of governance on tax revenue is observed significant in MIC and HIC. The sobel Z test confirms this significance. The mediation effect is noted across non resource taxes, non resource indirect taxes and VAT. In contrast, it is not observed in LIC, likely due to weaker institutional frameworks and less effective system.

In wealthy nations compared to developing nations, political institutions have a more substantial and vital role in determining inflow foreign direct investment. This can be as a result of excellent

institutions, lower transaction and information costs, which promote foreign investment, which in turn promotes economic development. Moreover, investors are encouraged to increase their financial investments in these nations by the political stability that comes with democracy.

A country that can enlarge its governance environment quality generally can attract more FDI (Mengistu and Adhikary 2011). Sabir, Rafique, and Abbas (2019) find that institutional quality is a key indicator that helps to arrange FDI inflow more in developed countries compared to developing countries

Table 2.3: Baseline estimation : Full sample

	(1)	(2)	(3)	(4)
	Sub-CGI1	Sub-CGI2	Sub-CGI3	CGI
Structural Model: Dep.Var: FDI				
Governance	0.366*** (0.080)	0.219*** (0.076)	0.320*** (0.095)	0.141*** (0.030)
GDP per capita grwth	0.221*** (0.074)	0.213*** (0.073)	0.208** (0.095)	0.214** (0.073)
REER	0.005 (0.003)	0.006* (0.003)	0.005 (0.003)	0.006* (0.003)
Openness	0.063*** (0.005)	0.063*** (0.005)	0.063*** (0.005)	0.062*** (0.005)
Mobil_sub_per	0.015*** (0.002)	0.017*** (0.002)	0.014*** (0.002)	0.015*** (0.002)
Constant	-2.959*** (0.729)	-3.040*** (0.737)	-2.737*** (0.713)	-2.995*** (0.729)
Structural Model: Dep.Var: Total tax revenue				
FDI	0.034* (0.020)	0.097*** (0.020)	0.067*** (0.020)	0.051** (0.018)
Governance	3.109*** (0.128)	1.504*** (0.166)	2.314*** (0.165)	1.266*** (0.59)
GDP per capita grwth	0.100* (0.40)	-0.006 (0.045)	0.006 (0.045)	0.029 (0.041)
Inflation	0.000* (0.000)	-0.001 (0.000)	0.001* (0.000)	0.000 (0.000)
Openness	-0.019*** (0.002)	-0.019*** (0.003)	-0.024*** (0.003)	-0.025*** (0.002)
Agriculture	-0.151*** (0.018)	-0.385*** (0.018)	-0.269*** (0.020)	-0.163*** (0.195)
Constant	18.704*** (0.443)	22.910*** (0.496)	21.756*** (0.494)	19.635*** (0.459)
Observations	1634	1634	1634	1634
SRMR	0.025	0.019	0.016	0.020
CD	0.665	0.532	0.548	0.620
Sobel Z test	(2.047)*	(2.463)**	(2.366)**	(2.352)**

Standard errors are in parentheses. Significance Codes, *** : 0.01; ** : 0.05; * : 0.1. **Source:** Authors' Computations.

Note (1):Institutions, (2): cultural tensions, (3): economic conditions

Table 2.4: Sub-sample heterogeneities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	LIC				MIC				HIC				World			
	nr_Taxes	nr_indirect	Taxes on G and S	Total_taxes	nr_Taxes	nr_indirect	Taxes on G and S	Total_taxes	nr_Taxes	nr_indirect	Taxes on G and S	Total_taxes	nr_Taxes	nr_indirect	Taxes on G and S	Total_taxes
CGI	0.212*	0.212*	0.191	0.225*	0.164***	0.224***	0.221***	0.182***	0.509***	0.484***	0.431***	0.507***	0.133***	0.145***	0.130***	0.141***
	(0.115)	(0.115)	(0.164)	(0.135)	(0.032)	(0.031)	(0.032)	(0.042)	(0.090)	(0.089)	(0.090)	(0.093)	(0.030)	(0.029)	(0.032)	(0.030)
GDP per Capita Growth	0.148*	0.148*	0.182	0.139*	0.126***	0.121***	0.132***	0.135***	0.361*	0.367*	0.347*	0.404*	0.198*	0.197*	0.220**	0.214**
	(0.085)	(0.085)	(0.120)	(0.082)	(0.025)	(0.027)	(0.026)	(0.024)	(0.178)	(0.176)	(0.169)	(0.169)	(0.076)	(0.077)	(0.078)	(0.073)
REER	-0.001	-0.001	-0.006	-0.003	-0.011***	-0.010***	-0.014**	-0.011**	0.019	0.019	0.024*	0.017	0.007*	0.008*	0.010*	0.006*
	(0.004)	(0.004)	(0.009)	(0.007)	(0.002)	(0.003)	(0.004)	(0.004)	(0.013)	(0.012)	(0.013)	(0.013)	(0.003)	(0.003)	(0.004)	(0.003)
Openness	0.059**	0.059**	0.071**	0.06**	0.023***	0.020***	0.024***	0.022***	0.069***	0.068***	0.092***	0.069***	0.063***	0.063***	0.079***	0.062***
	(0.021)	(0.021)	(0.027)	(0.018)	(0.003)	(0.003)	(0.003)	(0.002)	(0.007)	(0.006)	(0.009)	(0.006)	(0.006)	(0.005)	(0.007)	(0.005)
Mobile Subscription	0.016*	0.016*	0.008	0.014	0.007***	0.005*	0.009***	0.007***	0.027***	0.027***	0.020***	0.027***	0.016***	0.016***	0.015***	0.015***
	(0.008)	(0.008)	(0.017)	(0.013)	(0.002)	(0.002)	(0.002)	(0.001)	(0.005)	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.945	0.945	1.598	1.476	1.899***	2.193***	2.167***	2.698***	-7.917***	-7.725***	-9.205***	-7.315***	-3.204***	-3.238***	-4.606***	-2.995***
	(1.327)	(1.327)	(1.766)	(2.111)	(0.420)	(0.430)	(0.524)	(0.486)	(1.916)	(1.797)	(1.975)	(1.825)	(0.773)	(0.770)	(0.930)	(0.729)
FDI	0.026	-0.022	-0.032	0.049	0.234***	0.240***	0.246***	0.203*	0.069***	0.024*	0.020*	0.043**	0.070***	0.021*	0.028**	0.051**
	(0.033)	(0.033)	(0.025)	(0.043)	(0.0613)	(0.045)	(0.044)	(0.079)	(0.020)	(0.010)	(0.008)	(0.019)	(0.019)	(0.012)	(0.010)	(0.018)
CGI	0.157*	0.128*	-0.004	0.150*	0.804***	0.327***	0.185***	0.259**	1.509***	0.253***	0.143**	1.840***	1.158***	0.232***	0.153***	1.266***
	(0.092)	(0.065)	(0.040)	(0.066)	(0.089)	(0.057)	(0.044)	(0.096)	(0.140)	(0.059)	(0.052)	(0.137)	(0.052)	(0.027)	(0.024)	(0.59)
GDP per Capita Growth	-0.020	-0.012	-0.01	-0.005	0.031	0.094**	0.0729*	0.029	0.007	0.053	0.042	0.017	0.050	0.130***	0.103***	0.029
	(0.029)	(0.027)	(0.027)	(0.037)	(0.050)	(0.033)	(0.031)	(0.051)	(0.075)	(0.037)	(0.034)	(0.075)	(0.039)	(0.023)	(0.022)	(0.041)
Inflation	-0.013***	-0.008***	-0.008***	-0.012***	0.001***	0.002***	0.003***	0.002*	-0.044*	-0.006	-0.035***	-0.16	0.000*	0.002***	0.003***	0.000
	(0.002)	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)	(0.001)	(0.021)	(0.013)	(0.010)	(0.023)	(0.000)	(0.000)	(0.000)	(0.000)
Openness	0.046***	0.040***	0.040***	0.047***	-0.007	-0.006	-0.011**	0.010*	-0.023***	-0.003*	0.000	-0.27***	-0.022***	-0.007***	-0.004*	-0.025***
	(0.011)	(0.009)	(0.009)	(0.008)	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)	(0.001)	(0.002)	(0.023)	(0.002)	(0.001)	(0.001)	0.002)
Agriculture	-0.016	-0.033*	-0.033*	-0.005	-0.230***	-0.121***	-0.120***	-0.281***	0.298*	0.491***	0.413***	0.219	-0.156***	-0.090***	-0.095***	-0.163***
	(0.016)	(0.013)	(0.013)	(0.016)	(0.026)	(0.014)	(0.011)	(0.024)	(0.143)	(0.067)	(0.055)	(0.142)	(0.018)	(0.009)	(0.008)	(0.195)
Constant	6.692***	5.276***	3.752***	6.222***	18.377***	10.634***	6.642***	17.52***	16.664***	8.503***	4.878***	18.133***	19.149***	10.479***	6.382***	19.635***
	(0.748)	(0.592)	(0.592)	(0.687)	(0.642)	(0.412)	(0.412)	(0.525)	(1.025)	(0.420)	(0.371)	(1.128)	(0.371)	(0.211)	(0.207)	(0.459)
Observations	107	107	107	107	581	605	586	631	808	829	858	896	1496	1541	1516	1634
SRMR	0.073	0.055	0.062	0.070	0.035	0.021	0.031	0.040	0.023	0.032	0.048	0.021	0.022	0.026	0.036	0.020
CD	0.549	0.542	0.562	0.555	0.459	0.365	0.515	0.515	0.443	0.422	0.407	0.536	0.646	0.458	0.456	0.620
Sobel Z test	(0.729)	(-0.623)	(-0.864)	(0.950)	(3.036)**	(4.223)***	(4.299)***	(2.199)**	(2.865)**	(2.087)**	(2.076)**	(2.067)**	(2.796)***	(1.663)*	(2.300)**	(2.352)**

Standard errors are in parentheses. Significance Codes: *** : 0.01; ** : 0.05; * : 0.1.

Source: Authors' Computations.

2.6 Robustness check

We check whether our results remain significant when we include new control variables. Various other factors may affect the existing relationship between institutional quality, FDI and tax revenue. We therefore repeat our basic estimates, controlling for additional factors. First we individually include variables to control the effect of IQ on FDI in the first equation. In table 2.5, column (1) to column (4) We start by adding real interest rate as an important determinant of FDI (Faroh and Shen 2015; Musyoka and Ocharo 2018). Fixed telephone subscription (Kinoshita and Campos 2004), Labor force (C. H. Nguyen 2021) and 2008 financial crisis dummy variable (Mohapatra and Gopalaswamy 2016). Secondly, In the same table, column (5) to (8) present factors control individually the second equation (FDI→ Tax revenue) and (IQ→Tax revenue): urbanisation (Addison and Levin 2012), debt (Chaudhry and Munir 2010), population (Goudswaard and Van de Kar 1994) and also labor force (Cebula 2019).

We conducted another robustness test using alternative econometric methods. Firstly, we have used Seemingly Unrelated Regression (SUR) with our main dependent variable and two alternative variables (see table 2.7). In addition, in the same table, we use the aggregated measure of economic freedom: the Fraser Institute's Economic Freedom of the World index (EFW) and the political stability index from the WGI-World Bank. We find that these two alternative variables positively affect FDI and tax revenue. Hypotheses numbers 1,2, and 3 are validated. The initial benchmark estimations might face endogeneity issues. For example, FDI could influence institutional quality, and tax revenue might also affect the environment of institutional quality, suggesting potential reverse causality. To address this concern, we check the robustness of our study using sys-GMM estimation to correct for possible bias due to endogeneity. The analysis incorporates the first-order lag terms for FDI and the second order lag terms for tax revenue and performs system GMM estimation. The Arellano-Bond test indicates that the statistic's p values are 0.290, 0.279, 0.294, and 0.291 for the first equation and 0.213, 0.082, 0.059, and 0.142 for the second equation, supporting the use of the GMM method for our model. Additionally, the Hansen test shows a p-value of 0.222, 0.383, 0.227 and 0.215 for the first equation and 0.208, 0.055, 0.236 and 0.230 for the second one, confirming that the instrumental variables used are appropriate. For GMM, the autocorrelation test is performed using Arellano-Bond test for autocorrelation of first difference errors. The test fails to reject the null hypothesis of no autocorrelation in the second

order AR(2) for all regressions indicating that the error terms are not correlated with each other. For this condition of no autocorrelation, the use of GMM estimation is satisfied. Our results are robust to these specifications. Consequently the results validate hypotheses H1, H2 and H3. All these results are presented in Table 2.6.

Finally, we conducted another robustness test by excluding outliers countries in terms of FDI inflows from our sample to test the sensitivity of our results. These countries are Luxembourg and Liberia (see figure 2.5). Table 2.7 columns (1), (2), (3) and (4) contains the results obtained for the Baseline sample without these countries, present respectively the result for three sub_indices: institutions, cultural and political stability, economic conditions and the composite governance index which combines the three sub_indices mentioned above. Our results are still robust to these exclusion.

Despite these robustness tests, our results may still be affected by omitted variables and measurement errors. Some unobserved factors such as tax capacity, informality, infrastructure, or resource dependence are correlated with both governance and tax outcomes and could bias the estimated effects upward. In addition, governance indicators are perception based and subject to measurement noise. These potential biases could attenuate or distort the estimated relationships. Nevertheless, the consistency of results across specifications and alternative measures suggests that our main conclusions remain reliable, though they should be interpreted as conservative estimates.

Table 2.5: Robustness using additional control variables :Full sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CGI → FDI	0.077** (0.026)	0.124** (0.048)	0.167*** (0.043)	0.124*** (0.032)	0.141*** (0.030)	0.273*** (0.053)	0.139*** (0.030)	0.142*** (0.031)
GDP per capita growth	0.188** (0.063)	0.214*** (0.073)	0.179*** (0.038)	0.221*** (0.075)	0.214*** (0.073)	0.343** (0.159)	0.215*** (0.074)	0.221*** (0.075)
REER	0.005* (0.002)	0.006* (0.003)	0.007 (0.008)	0.007* (0.003)	0.006* (0.003)	0.000 (0.010)	0.006* (0.003)	0.007** (0.003)
Openness	0.027*** (0.006)	0.063*** (0.005)	0.046*** (0.005)	0.063*** (0.005)	0.062*** (0.005)	0.047*** (0.003)	0.062*** (0.005)	0.063*** (0.005)
Mobile subscription	0.004* (0.002)	0.015*** (0.002)	0.012*** (0.003)	0.014*** (0.002)	0.015*** (0.002)	0.012*** (0.003)	0.015*** (0.002)	0.015*** (0.002)
Constant	-1.842** (0.662)	-3.111*** (0.774)	-1.562** (0.793)	-4.201*** (1.276)	-2.995*** (0.729)	-2.067* (1.154)	-3.011*** (0.731)	-3.106*** (0.751)
FDI → Tax revenue	0.056*** (0.019)	0.048** (0.018)	0.052*** (0.023)	0.051*** (0.018)	0.050*** (0.018)	0.091*** (0.037)	0.055*** (0.018)	0.044*** (0.019)
CGI →Tax revenue	1.238*** (0.062)	1.265*** (0.059)	1.046*** (0.068)	1.27*** (0.061)	1.257*** (0.062)	1.060*** (0.105)	1.116*** (0.057)	1.120*** (0.059)
GDP per capita growth	0.045 (0.042)	0.028 (0.040)	0.100* (0.047)	0.032 (0.041)	0.032 (0.040)	0.098 (0.066)	-0.061 (0.037)	0.035 (0.041)
Inflation	0.00 (0.000)	0.000 (0.000)	0.001 (0.002)	0.000 (0.000)	0.000 (0.000)	-0.023*** (0.004)	0.000 (0.000)	0.000 (0.000)
Openness	-0.025*** (0.002)	-0.025*** (0.002)	-0.029*** (0.002)	-0.025*** (0.002)	-0.025*** (0.002)	-0.038*** (0.003)	-0.018*** (0.002)	-0.023*** (0.003)
Agriculture	-0.167*** (0.020)	-0.165*** (0.019)	-0.149*** (0.021)	-0.164*** (0.019)	-0.153*** (0.020)	-0.050 (0.042)	-0.082*** (0.020)	-0.170*** (0.019)
Constant	19.578*** (0.475)	19.660*** (0.460)	17.866*** (0.511)	19.581*** (0.467)	18.999*** (0.843)	20.009*** (0.922)	21.302*** (0.428)	10.034*** (1.537)
Crisis dummy	0.107*** (0.036)							
Fixed tel sub		0.003 (0.009)						
Real interest rate			0.007 (0.008)					
Labor force				0.018 (0.017)				
Urban population					0.007 (0.011)			
Debt						0.025*** (0.006)		
Population							-1.970*** (0.143)	
Labor force								0.138*** (0.022)
Observations	1537	1608	988	1574	1634	760	1608	1574
SRMR	0.020	0.026	0.027	0.021	0.019	0.026	0.020	0.021
CD	0.726	0.624	0.548	0.621	0.620	0.533	0.624	0.621
Sobel Z test	1.997**	1.738**	1.928**	2.265**	2.213**	2.213**	2.594***	2.104**

Source: Authors' calculations. Note: Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1. Estimations are based on SEM. (1)(2)(3)(4): are additional controls of FDI. (5)(6)(7)(8): are additional controls of Tax revenue

Table 2.6: Robustness check using Sys-GMM

	(1)	(2)	(3)	(4)
	Sub-CGI1	Sub-CGI2	Sub-CGI3	CGI
Equation 1: Dep.Var: FDI				
L.FDI	0.254*** (0.004)	0.260*** (0.002)	0.250*** (0.004)	0.252*** (0.004)
Governance	0.191*** (0.0331)	0.224*** (0.057)	0.396*** (0.382)	0.056*** (0.013)
GDP per capita growth	0.155*** (0.009)	0.135*** (0.004)	0.142*** (0.010)	0.155*** (0.009)
REER	0.005** (0.002)	-0.007*** (0.001)	0.005*** (0.001)	0.006*** (0.001)
Openness	0.063*** (0.000)	0.070*** (0.000)	0.063*** (0.000)	0.063*** (0.000)
Mobil_sub_per	0.003** (0.001)	-0.021*** (0.000)	-0.002 (0.001)	0.005*** (0.001)
Constant	-2.994*** (0.243)	-0.606 (0.195)	-2.688*** (0.211)	-3.133*** (0.222)
Equation 2: Dep.Var: Total tax revenue				
L1.Tax revenue	0.806*** (0.007)	0.627*** (0.011)	0.894*** (0.004)	0.789*** (0.007)
L2.Tax revenue	-0.075*** (0.003)		-0.047*** (0.002)	-0.066*** (0.002)
FDI	0.096*** (0.005)	0.151*** (0.015)	0.039*** (0.003)	0.098*** (0.004)
Governance	1.098*** (0.026)	0.577*** (0.060)	0.578*** (0.016)	0.528*** (0.012)
GDP per capita growth	0.040*** (0.002)	0.212*** (0.013)	0.042*** (0.003)	0.032*** (0.003)
Inflation	0.001*** (0.000)	0.004*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Openness	-0.005*** (0.000)	-0.012*** (0.002)	-0.004*** (0.000)	-0.010*** (0.000)
Agriculture	-0.012*** (0.003)	-0.102*** (0.010)	-0.010*** (0.002)	0.002 (0.004)
Constant	4.455*** (0.186)	7.147*** (0.374)	2.645*** (0.127)	4.603*** (0.203)
Observations	1680 /2205	1680/2331	1680/2205	1680/2205
Nbr of instruments	60/109	71/85	60/109	60/109
Nbr of groups	73/119	73/121	73/119	73/119
AR(2)	0.290/0.213	0.279/0.082	0.294/0.059	0.291/0.142
Hansen	0.222/0.208	0.383/0.055	0.227/0.236	0.215/0.230

Standard errors are in parentheses. Significance Codes, *** : 0.01; ** : 0.05; * : 0.1. **Source:** Authors' Computations.

Note (1): Institutions, (2): cultural tensions, (3): economic conditions

Table 2.7: Robustness using alternative Independent variable with alternative methods: Full sample

	SEM	SUR	SEM	SUR	SEM	SUR
Political stability WDI→ FDI	0.737*** (0.128)	0.736*** (0.217)				
Economic freedom → FDI			0.611*** (0.142)	0.617*** (0.234)		
ICRG CGI → FDI					0.141*** (0.030)	0.140*** (0.045)
GDP per capita growth	0.262*** (0.089)	0.262*** (0.053)	0.276*** (0.102)	0.276*** (0.060)	0.214*** (0.073)	0.214*** (0.045)
REER	0.010** (0.004)	0.010 (0.008)	0.010* (0.005)	0.010 (0.010)	0.006* (0.003)	0.006 (0.006)
Openness	0.067*** (0.006)	0.067*** (0.003)	0.071*** (0.007)	0.071*** (0.003)	0.062*** (0.005)	0.062*** (0.002)
Mobile subscription	0.010*** (0.003)	0.011*** (0.003)	0.005 (0.003)	0.005 (0.005)	0.015*** (0.002)	0.015*** (0.003)
Constant	-3.293*** (0.890)	-3.280*** (0.950)	-7.465*** (1.401)	-7.468*** (1.863)	-2.995*** (0.729)	-2.962 (0.790)
FDI → Tax revenue	0.057*** (0.017)	0.063** (0.024)	0.065** (0.026)	0.064** (0.026)	0.051*** (0.018)	0.065*** (0.023)
Political stability WDI→ FDI	3.945*** (0.280)	3.941*** (0.234)				
Economic freedom → FDI			2.785*** (0.245)	2.785*** (0.245)		
ICRG CGI → FDI					1.266*** (0.059)	1.263*** (0.056)
GDP per capita growth	-0.015 (0.047)	-0.017 (0.050)	-0.020 (0.052)	-0.022 (0.003)	0.029 (0.041)	0.027 (0.043)
Inflation	-0.001 (0.002)	-0.001 (0.004)	0.002*** (0.000)	0.002 (0.002)	0.000 (0.000)	0.000 (0.001)
Openness	-0.024*** (0.003)	-0.024*** (0.003)	-0.021*** (0.004)	-0.022*** (0.003)	-0.025*** (0.002)	-0.025*** (0.003)
Agriculture	-0.274*** (0.020)	-0.274*** (0.020)	-0.281*** (0.024)	-0.284*** (0.025)	-0.163*** (0.019)	-0.162*** (0.020)
Constant	22.466*** (0.398)	22.473*** (0.383)	3.805* (1.949)	3.631* (1.854)	19.641*** (0.460)	19.799*** (0.381)
Observations	1386	1386	1201	1201	1634	1634

Source: Authors' calculations. Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 2.8: Robustness check dropping outliers: Full sample

	(1)	(2)	(3)	(4)
	Sub-CGI1	Sub-CGI2	Sub-CGI3	CGI
Structural Model: Dep.Var: FDI				
Governance	0.393*** (0.087)	0.180** (0.072)	0.396*** (0.097)	0.153*** (0.033)
GDP per capita growth	0.259*** (0.074)	0.240*** (0.074)	0.238*** (0.072)	0.253*** (0.073)
REER	0.001 (0.003)	0.004 (0.003)	0.001 (0.003)	0.003 (0.003)
Openness	0.054*** (0.005)	0.055*** (0.005)	0.054*** (0.005)	0.054*** (0.005)
Mobil_sub_per	0.015*** (0.002)	0.016*** (0.002)	0.013*** (0.002)	0.015*** (0.002)
Constant	-2.392*** (0.718)	-2.225*** (0.684)	-2.090*** (0.687)	-1.989*** (0.730)
Structural Model: Dep.Var: Total tax revenue				
FDI	0.041* (0.021)	0.094*** (0.022)	0.073*** (0.021)	0.057*** (0.020)
Governance	3.048*** (0.130)	1.494*** (0.166)	2.299*** (0.164)	1.250*** (0.059)
GDP per capita growth	-0.062 (0.038)	0.008 (0.046)	0.060 (0.047)	0.041 (0.042)
Inflation	0.000 (0.000)	-0.001 (0.000)	0.000 (0.000)	-3.190 (0.000)
Openness	-0.019*** (0.002)	-0.021*** (0.003)	-0.026*** (0.003)	-0.025*** (0.002)
Agriculture	-0.149*** (0.018)	-0.385*** (0.019)	-0.191*** (0.021)	-0.159*** (0.019)
Constant	19.533*** (0.397)	23.039*** (0.397)	17.928*** (0.582)	20.104*** (0.459)
Observations	1612	1612	1612	1612
SRMR	0.025	0.020	0.016	0.019
CD	0.644	0.504	0.522	0.601
Sobel Z test	(1.752)*	(2.136)**	(2.112)**	(2.410)**

Standard errors are in parentheses. Significance Codes, *** : 0.01; ** : 0.05; * : 0.1. **Source:** Authors' Computations.

Note (1): Institutions, (2): cultural tensions, (3): economic conditions

2.7 Conclusions and implications

To examine the link between institutional quality and tax revenue, this study uses panel data from 136 countries spanning 27 years. It applies structural equation modeling alongside three alternative estimators: SUR and GMM. The findings suggest a positive relationship between institutional quality and tax revenue, indicating that stronger institutions contribute to higher tax revenues. Further analysis shows that cultural and political stability, as well as economic conditions, enhance tax revenue by attracting or improving foreign direct investment (FDI) in the host country. Among the sub-indexes, institutions have the most significant direct impact on tax revenues, though their indirect effect via FDI is less pronounced.

However, We observed that the impact of good governance on taxes on goods and services not significant in low income countries mostly african countries . The effect on tax total tax revenue and non ressource taxes increases as countries move from Middle to High Income, with also high impact in HIC seen in the effect on FDI. This trend is likely attributed to the greater importance of institutional quality and low political risk in high-income countries. Conversely, the most significant effect of FDI on tax revenue was found in Middle Income Countries, possibly due to the fact that Middle income countries are often in a phase of rapid industrialization, attracting FDI in manufacturing and industrial sectors. These sectors typically generate higher tax revenues through various channels, such as corporate taxes, consumption taxes, and social security contributions. Industrialization also leads to spillover effects, increasing household incomes and consumption, which in turn generates additional tax revenue. Following the approach of Baron and Kenny (1986), the mediation role of FDI was most pronounced in Middle and then on high income countries , (Firms in middle-income countries are likely to have stronger capability to use their absorptive capacity to attract and utilize knowledge spillovers than low-income countries. This is in line with studies of Blomstrom, Lipsey, and Zejan (1992), Jyun-Yi and Chih-Chiang (2008) andAlguacil, Cuadros, and Orts (2011).

The effect of FDI on tax revenue and its mediation role on total tax revenue in low-income African countries does not exist, as many of these countries offer tax incentives to attract foreign investors, but this practice can distort resource allocation and hinder long-term growth. This issue becomes more pronounced as multinational companies engage in tax evasion, which threatens the funding necessary

for sustainable development. "At least five countries within the West African Economic and Monetary Union (WAEMU) are among the two-thirds of sub-Saharan African nations that currently offer tax holidays to attract foreign investments, which are often associated with highly mobile tax bases. Free enterprise zones were established in Senegal in 1974, Togo in 1989, Mali in 1991, Côte d'Ivoire in 2004, and Benin in 2005. Although these measures have led to the Union's foreign direct investment (FDI) to gross domestic product (GDP) ratio reaching its peak in 2009 at 2.99%, such incentives may not only erode the tax base but also complicate tax administration and significantly contribute to revenue loss and leakage from the taxable economy"(Okey 2013).⁴

These findings suggest several policy implications. Good governance and FDI appear to be a valuable mechanism for increasing tax revenues in Middle and High Income Countries. Institutional factors, economic conditions and cultural stability also influence positively FDI in developing countries but it needs effective and efficient use of tax incentives to happen. Therefore, improving institutional quality enhances the likelihood of FDI positively impacting tax revenue (Fund et al. 2015).

The study acknowledges limitations, particularly that FDI acts as only a partial mediator, suggesting other factors may influence the relationship between institutional quality and tax revenue. Future research should explore additional potential mediators to deepen the understanding of this relationship.

The study highlights three key implications: first, there is a need to enhance institutional quality (IQ), as it positively affects tax revenues across low, middle, and high-income countries. Thus, improving institutional design and quality globally is crucial. Second, policymakers should focus on boosting economic conditions and maintaining political and cultural stability to attract more foreign investment. Third, in low-income countries with the lowest levels of institutional quality, effective tax incentives should be implemented. Low income countries should adopt best practices in tax reforms, particularly VAT reforms, to increase revenue effectively. Targeted VAT exemptions and zero rates for goods and services used predominantly by lower-income groups can help alleviate their tax burden, though they must be managed carefully to avoid adverse effects on exports, administrative complexity, and tax avoidance (Cnossen 2015).

⁴Low income countries of this study: Gambia, Guinea, Guinea-Bissau, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Sierra Leone, Somalia, Togo, Uganda, Yemen, Syria, the Democratic Republic of Congo, and Burkina Faso

2.8 Appendices

2.8.1 Appendix A : Correlation matrices

Table 2.9: Correlation matrix (Equation 1)

	FDI	CGI	GDP_percap	Exch rate	Openness	Mobile sub
FDI	1.000					
CGI	0.216	1.000				
GDP percapita	0.142	0.024	1.000			
Exch rate	-0.039	-0.128	-0.118	1.000		
Openness	0.525	0.269	0.112	-0.058	1.000	
Mobile sub	0.213	0.247	-0.039	-0.068	0.221	1.000

Table 2.10: Correlation Matrix (Equation 2)

	Tax revenue	FDI	CGI	GDP pr capita	Inflation	Openness	Agriculture
Tax revenue	1.000						
FDI	0.143	1.000					
CGI	0.636	0.209	1.000				
GDP per capita	0.046	0.146	0.008	1.000			
Inflation	-0.012	-0.036	-0.052	-0.078	1.000		
Openness	0.131	0.485	0.310	0.104	-0.067	1.000	
Agriculture	-0.518	-0.142	-0.635	-0.026	0.043	-0.281	1.000

Table 2.11: Correlation matrix (Pca1: Institutions)

	Law and order	Democratic accountability	Bureaucratic quality	Corruption
Law and order	1.0000			
Democratic accountability	0.4067	1.0000		
Bureaucratic quality	0.6585	0.5928	1.0000	
Corruption	0.6508	0.5164	0.6861	1.0000

Table 2.12: Correlation matrix (Pca2: Cultural conflicts)

	Ethnic tensions	Religious tensions	External conflicts	Internal Conflicts
Ethnic tensions	1.0000			
Religious tensions	0.3836	1.0000		
External conflicts	0.3867	0.3645	1.0000	
Internal conflicts	0.5520	0.4345	0.5794	1.0000

Table 2.13: Correlation matrix (Pca3: Economic conditions)

	Government stability	Socio-eco conditions	Military in politics	Investment profile
Government stability	1.0000			
Socio-eco conditions	0.1794	1.0000		
Military in politics	0.1323	0.6289	1.0000	
Investment profile	0.4346	0.6073	0.5313	1.0000

2.8.2 Appendix B : Principal component analysis

Table 2.14: Component indexes names and constituent variables

CGI	Institutions	Cultural conflicts	Economic conditions
Institutions	Law and order	Internal conflicts	Government stability
Cultural conflicts	Democratic accountability	External conflicts	Socio-economic conditions
Economic conditions	Bureaucratic quality	Religious tensions	Investment profile
	Corruption	Ethnic tensions	Military in politics

2.8.3 Appendix D : Variable Definitions

Table 2.15: Variable Definitions and Sources

Variable	Definition	Source
<i>Control variables:</i>		
GDP per capita growth (annual %)	The annual percentage growth rate of GDP per capita is calculated using constant local currency. GDP per capita is defined as the gross domestic product divided by the midyear population. The GDP at purchaser's prices represents the total gross value added by all resident producers in the economy, plus any product taxes, minus any subsidies not included in the product value. This measure is computed without accounting for depreciation of manufactured assets or the depletion and degradation of natural resources.	WDI-World Bank
Inflation, consumer prices (annual %)	Inflation, as indicated by the consumer price index, represents the annual percentage change in the cost for the average consumer to purchase a basket of goods and services. This basket may be fixed or adjusted at set intervals, such as annually. The measurement typically uses the Laspeyres formula.	WDI-World Bank
Openness (% of GDP)	Openness is calculated as the total of exports and imports of goods and services, expressed as a percentage of gross domestic product.	WDI-World Bank
Real effective exchange rate	s a measure of the value of a currency against a weighted average of several foreign currencies. It is typically adjusted by dividing it by a price deflator or cost index to account for changes in relative prices or inflation. This adjustment helps provide a more accurate representation of a currency's real value in international trade.	WDI-World Bank
Mobile cellular subscriptions (per 100 people)	Subscriptions to a public mobile telephone service that provide access to the PSTN using cellular technology.	WDI-World Bank
Agriculture, value added (% of GDP)	Includes forestry, hunting, and fishing, along with the cultivation of crops and livestock production.	WDI-World Bank

Table 2.16: Variable Definitions and Sources

Variable	Definion	Source
<i>Dependant variables :</i>		
FDI net inflows(% of GDP)	Net inflows of investment refer to the acquisition of a lasting management interest in an enterprise located in a different economy than that of the investor. This typically involves obtaining 10 percent or more of the voting stock in the target enterprise.	WDI-World Bank
Tax revenues,(% of GDP)	It refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines as fines, penalties, and most social security contributions are excluded.Refunds and corrections of erroneously collected tax revenue are treated as negative revenue.	GRD/UNI-WIDER
Taxes on property (% of GDP)	Taxes on Property are compulsory financial charges imposed by governments on the ownership or transfer of real estate and other forms of property. These taxes are part of the broader category of local and regional taxes and are crucial for understanding regional fiscal dynamics.	GRD/UNI-WIDER
Taxes on Income, Profits, and Capital Gains(% of GDP)	are a category of taxes imposed on various forms of economic returns, reflecting how governments collect revenue from individuals and businesses within a region. These taxes play a crucial role in regional fiscal policy and economic analysis.	GRD/ UNI-WIDER
Taxes on G & S	are levies imposed on the consumption or sale of goods and services. These taxes are collected by regional or local governments and contribute to the overall revenue system at the regional level. They encompass various forms of consumption taxes, including:Value Added Tax (VAT) / Goods and Services Tax	GRD/ UNI-WIDER
Direct taxes	are taxes imposed directly on the income, wealth, or profits of individuals and entities. They are collected by regional or national governments and reflect the ability-to-pay principle.it includes:Personal Income Taxes,Corporate Taxes	GRD/ UNI-WIDER

Table 2.17: Variable Definitions and Sources

Variable	Definition	Source
<i>Institutional indices:</i>		
Socio-economic pressures	At work in society that might restrain government action or elevate social dissatisfaction and thus destabilise the political regime.	PRS Group-ICRG
Investment profile	Factors related to the risk of investment that are not covered by other (financial and economic) risk components, such as contract viability (expropriation), profits repatriation or payment delays.	PRS Group-ICRG
Internal conflict	Measuring political violence within the country and its actual or potential impact on governance by focusing on, for instance, civil war, terrorism, political violence or civil disorder.	PRS Group-ICRG
External conflict	Risk to the incumbent government from foreign action, ranging from non-violent external pressure, such as diplomatic pressures.	PRS Group-ICRG
Military in politics	Could signal that the government is unable to function effectively and that, therefore, the country might have an unfavourable environment for business.	PRS Group-ICRG
Corruption	Measures the level of corruption in the society.	PRS Group
Religious tensions	Stemming from the domination of society and/or governance by a single religious group seeking, for instance, to replace civil by religious law or to exclude other religions from the political and social process.	PRS Group-ICRG
Ethnic tensions	Assesses the degree of tensions among ethnic groups attributable to racial, nationality or language divisions.	PRS Group-ICRG
Law and order	Strength and impartiality of the legal system.	PRS Group-ICRG
Democratic accountability	Responsiveness of the government to its citizens, but also to fundamental civil liberties and political rights.	PRS Group-ICRG
Quality of the bureaucracy	Might act as a shock absorber tending to reduce policy revisions if governments change.	PRS Group-ICRG

2.8.4 Appendix E : List of countries

Table 2.18: List of countries

Afghanistan	Djibouti	Kyrgyz Republic	Samoa
Albania	Dominica	Lao PDR	San Marino
Algeria	Dominican Republic	Latvia	Sao Tome and Principe
American Samoa	Ecuador	Lebanon	Saudi Arabia
Andorra	Egypt	Lesotho	Senegal
Angola	El Salvador	Libya	Serbia
Antigua and Barbuda	Eritrea	Liechtenstein	Sierra Leone
Argentina	Estonia	Lithuania	Sint Maarten (Dutch part)
Armenia	Eswatini	Macao SAR	Slovak Republic
Aruba	Ethiopia	Madagascar	Slovenia
Australia	Faroe Islands	Malawi	Solomon Islands
Austria	Fiji	Malaysia	Somalia
Bahamas	Finland	Maldives	South Africa
Bahrain	France	Mali	South Sudan
Bangladesh	French Polynesia	Marshall Islands	Spain
Barbados	Gabon	Mauritania	Sri Lanka
Belarus	Gambia	Mauritius	St Martin (French part)
Belgium	Georgia	Mexico	St. Lucia
Belize	Germany	Micronesia	Sudan
Benin	Ghana	Moldova	Suriname
Bermuda	Gibraltar	Monaco	Sweden
Bhutan	Greece	Mongolia	Switzerland
Bolivia	Greenland	Montenegro	Syrian Arab Republic
Bosnia and Herzegovina	Grenada	Morocco	Tajikistan
Botswana	Guam	Myanmar	Tanzania
Brazil	Guatemala	Namibia	Thailand
British Virgin Islands	Guinea	Nauru	Timor-Leste
Brunei	Guinea-Bissau	Nepal	Togo
Bulgaria	Guyana	New Caledonia	Tonga
Burkina Faso	Haiti	New Zealand	Trinidad and Tobago
Burundi	Honduras	Nicaragua	Tunisia
Cabo Verde	Hong Kong SAR	Niger	Turkey
Cambodia	Hungary	Nigeria	Turkmenistan
Cameroon	Iceland	North Macedonia	Turks and Caicos Islands
Canada	India	Northern Mariana Islands	Tuvalu
Cayman Islands	Indonesia	Norway	Uganda
Central African Republic	Iran	Oman	Ukraine
Chad	Iraq	Pakistan	United Arab Emirates
Channel Islands	Isle of Man	Palau	United Kingdom
Chile	Israel	Panama	United States
China	Italy	Papua New Guinea	Uruguay
Colombia	Jamaica	Paraguay	Uzbekistan
Comoros	Japan	Peru	Vanuatu
Congo	Jordan	Philippines	Venezuela
Costa Rica	Kazakhstan	Poland	Vietnam
Cote d'Ivoire	Kenya	Portugal	Virgin Islands (US)
Croatia	Kiribati	Puerto Rico	West Bank and Gaza
Cuba	Korea	Qatar	Yemen
Curacao	Korea	Romania	Zambia
Czech Republic	Kosovo	Russian Federation	Zimbabwe
Denmark	Kuwait	Rwanda	

Chapter 3

Value-added taxation and Economic Efficiency : Evidence from Tunisian Experience

Economic theory suggests that the value-added tax (VAT) is an efficient taxation system, which largely explains its rapid adoption across the world. However, there is no empirical evidence confirming this prediction in the case of Tunisia, and only a few studies exist for developing countries. In this study, we estimate the efficiency gains from the introduction of VAT using the synthetic control method. These results indicate that VAT has a positive and economically significant effect on economic efficiency, although the magnitude of this effect remains modest. These findings are robust across a range of placebo tests and sensitivity analyses.

Keywords: VAT, Tunisia, Synthetic control method, economic efficiency.

JEL: E6,H25, H20, 040

3.1 Introduction

The value-added tax (VAT) has become one of the most significant fiscal innovations of the past half-century. From its beginnings in Europe in the mid-20th century, VAT has expanded to over 160 countries and now generates roughly one-quarter of the world's total tax revenue (Ebrill, M. M. Keen, and M. V. P. Perry 2001; M. Keen and Lockwood 2010). Policymakers in both advanced and developing economies have embraced it not only for its revenue-raising capacity but also for its potential to improve economic efficiency. VAT's efficiency appeal lies in its design. Unlike turnover taxes, which impose multiple layers of taxation on intermediate transactions, VAT taxes only value added at each production stage and refunds taxes paid on inputs. This structure ensures that the tax burden falls solely on final consumption, thereby eliminating distortions caused by "tax cascading" and allowing firms to organize production based on efficiency rather than tax avoidance. Thus, when a value added tax replaces distortionary levies, a profit maximizing firm reallocates resources to the most efficient production mix, increasing output per worker a direct measure of economic efficiency.

The production efficiency theorem of P. A. Diamond and Mirrlees (1971), which asserts that even in the presence of other distortions, an optimal tax system shouldn't impact businesses' production choices, provides support for an effective tax system. The production efficiency theorem makes the assumption that there is no informal economy or tax evasion. However, the effectiveness of the VAT is predicated on the idea that it is well designed and implemented. The VAT turns into a partial production tax and causes production inefficiencies if any of these presumptions are broken. Several of these presumptions are broken in numerous situations. Firstly, small businesses are free from VAT in practically every country since the administrative expenses paid by these businesses exceed the tax revenue collected. Because it is difficult to tax the agriculture and service industries, many developing nations also exempt the majority of these businesses. Tax refunds on input purchases are not available to exempt businesses, which may result in production inefficiencies. In addition to being pervasive in developing nations (Schneider 2005; Alm and Embaye 2013), tax evasion and the informal economy can also skew a company's operations (Skinner and Slemrod 1985; Piggott and Whalley 2001; Emran and Stiglitz 2005). Lastly, because the cost of compliance with a VAT is thought to be higher than that of a

sales or turnover tax, particularly for small and medium-sized businesses, the VAT may force certain businesses into the informal sector (Hines Jr 2004; Coolidge 2012).

While there is a growing body of research on VAT and its impact on the economy, many studies focus primarily on VAT revenue as a percentage of GDP, examining how tax collection affects economic performance (Unegbu and Irefer 2011; Njogu 2015; Sayari, Jassem, Sahar, et al. 2023). However, few studies directly assess the effect of VAT adoption itself (Ufier 2014; Adhikari 2020). To the best of our knowledge, Adhikari (2020)'s cross-country study is the only study examining the effect of vat introduction on labor productivity. It finds that value-added tax adoption is, on average, associated with positive and economically meaningful gains in efficiency; however, the effect is driven by richer countries; for poorer countries, the impact is not statistically significant.

All The studies above raise crucial questions: Does a value-added tax improve Tunisia's economic efficiency? Are Tunisia's VAT design, implementation, and operating environment sufficiently robust to make it efficient?

We follow Adhikari (2020) and implement the synthetic control method (Abadie and Gardeazabal 2003; Abadie, A. Diamond, and Hainmueller 2010; Abadie, A. Diamond, and Hainmueller 2015) to study Tunisia. SCM is preferred in this study because it provides a transparent and data driven way to construct a credible counterfactual for Tunisia in the absence of VAT adoption. Unlike the Difference-in-Differences (DiD) approach, which relies on the strong assumption of parallel pretreatment trends between treated and control units, SCM relaxes this requirement by creating a weighted combination of untreated countries that closely reproduces Tunisia's pre-reform trajectory. This makes it particularly suitable for a single country case study where structural and institutional heterogeneity across countries makes the parallel trend assumption implausible. Moreover, SCM explicitly matches both levels and trends of key predictors, allows for time varying unobserved heterogeneity, and provides a clear graphical interpretation of the treatment effect over time. While SCM is more data-intensive and limited to one treated unit, it offers stronger internal validity and interpretability than DiD, propensity score matching, or standard panel fixed-effects models in contexts with unique country-level policy interventions such as Tunisia's VAT reform. Using Penn World Table (PWT) version 10.01 (Feenstra, Inklaar, and Timmer 2015), we estimate the effect of introducing a value-added tax (VAT) on economic efficiency, proxied by

output per worker. We also examine two transmission channels: (i) total factor productivity (TFP) and (ii) the stock of physical capital.

The results indicate statistically significant, but modest efficiency gains from VAT adoption, concentrated in the short run. The transmission through both TFP and physical capital is also limited. These patterns suggest that the theoretical advantages of VAT do not automatically materialize without supportive conditions. Findings are robust to a battery of placebo reassignments and sensitivity checks.

3.2 Tunisian Tax System and reform of 1988

3.2.1 Trend and structure of tax revenue

In this section, we provide some stylized facts on VAT Tunisia between 1986 and 2016¹. Figure 3.1 illustrates the evolution of the structure of tax revenues in Tunisia shows that during the period 1986–2016, the composition of tax revenues remained dominated by indirect taxes². However, their share declined significantly, falling from about 76.9% of total revenues in 1986 to 55.7% in 2016, with an average of approximately 69.1% over the entire period. The 1988 tax reform marked a decisive turning point in the fiscal system. The Value-Added Tax (VAT) was introduced to replace the former turnover tax regime, which was characterized by a highly complex structure of different rates. The new system established a single, broad-based tax with only three differentiated rates (6%, 17%, and 29%), thereby simplifying and clarifying the framework of indirect taxation. This reform not only enhanced neutrality and transparency but also positioned the VAT as the central pillar of consumption taxation in Tunisia³.

The introduction of the Value-Added Tax (VAT) in 1988 replaced the former turnover tax system and quickly became the central pillar of consumption taxation. In parallel, the 1989 reform unified the Personal Income Tax and the Corporate Income Tax, thereby broadening the base of direct taxation. Another major turning point occurred in 1995, when Tunisia became the first Southern Mediterranean

¹Data from the Ministry of Finance of Tunisia are available starting in 1986, with 2016 as the final year used in our SCM analysis

²In line with Alm (2016).

³Law No. 88-61 of 2 June 1988 promulgating the Value-Added Tax Code.

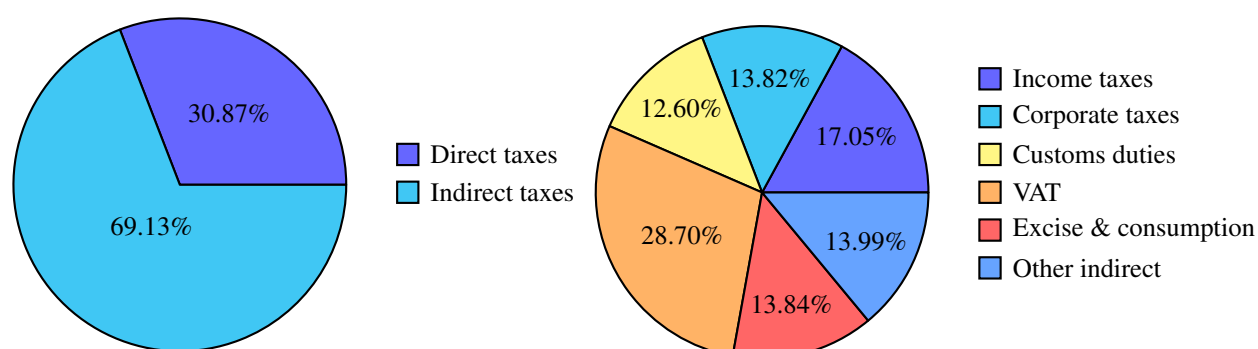


Figure 3.1: Tunisia's Average Tax Structure (1986–2016): Aggregated vs Detailed

Author's calculation. Source: Ministry of Public Finance of Tunisia

country to sign a free trade agreement with the European Union. The core provision of this agreement, signed on July 17, 1995, was the gradual elimination of customs duties and related taxes, with a phased schedule ranging from five to twelve years depending on product categories. This liberalization led to a sharp decline in customs revenues, as evidenced by a peak in 1995 followed by a steady decline between 1996 and 1998. In response, fiscal policy shifted the burden toward domestic taxation primarily VAT, excise duties, and corporate income tax. To offset the customs revenue shortfall, the authorities expanded indirect taxation by creating an intermediate VAT rate of 10%, raising the standard rate from 17% to 18% in 1998, increasing excise duties, and temporarily introducing levies such as the Provisional Complementary Duty and Complementary Import Levy. Thus, the structural transformation of Tunisia's tax system was characterized by a progressive substitution of trade-related revenues with internal taxation, a process fully consistent with the objectives of tax reform aimed at greater simplicity, neutrality, and fiscal resilience.

It is important to emphasize that indirect taxation in Tunisia has been predominantly driven by the Value-Added Tax (VAT). Over the period 1986–2016, VAT accounted on average for 41.5% of total indirect taxes, while the remaining 58.5% were distributed among excise duties, other consumption taxes, and miscellaneous indirect levies. Within this structure, customs duties alone represented 18.2% of total indirect taxation. More significantly, VAT revenues contributed an average of 28.7% to total tax revenues, highlighting its central role within the Tunisian fiscal system (see Figure 3.2). This structural

predominance of VAT provides the primary rationale for a detailed evaluation of its performance and its broader implications for public finance in Tunisia.

3.2.2 Evolution of Tunisian VAT

The introduction of VAT in 1988 marked a major turning point in Tunisia's fiscal history. From its inception, with three differentiated rates (6%, 17% and 29%), VAT progressively replaced the turnover tax, which comprised no fewer than 45 different rates, including 23 specific rates and 22 ad valorem rates. In addition to abolishing the turnover tax, the reform also eliminated a set of annex indirect taxes that coexisted with it, such as the tax on foreign exchange operations, the tax on profits allocated to the export promotion fund, customs formalities taxes on imports and exports, as well as the tax on certain imported food products. The removal of these taxes, together with the replacement of the turnover tax, initially led to a fiscal shortfall, since the new VAT system was broader and more transparent but less cumulative than the previous system. To offset this revenue loss, as observed in the evolution of fiscal revenue and indirect tax curves as a percentage of GDP (Figures 3.3 and 3.4), a new intermediate VAT rate of 10% was introduced, in addition to the existing rates (6%, 17%, and 29%). Furthermore, as of January 1, 1988, the standard rate of 17% was raised to 18%. At first glance, this reform appeared to affect only one rate the 17% rate while introducing a new 10% rate. In practice, however, its impact was much broader: many products initially subject to the reduced 6% rate were reclassified under the 10% rate, with the exception of agricultural and fisheries products, while certain goods taxed at 10% were shifted to the standard 18% rate. Likewise, most goods taxed at the 17% rate before 1988 became subject to the 18% rate. According to Joint Note No. 24 of 2007, Article 13 of a law provided for the elimination of the 29% VAT rate, which applied to specific goods considered "luxury" or heavily taxable, listed in Table C of the VAT Code (Article 7), such as: high-end passenger cars and similar vehicles, certain household appliances and electronic products deemed non-essential and high value-added goods mainly intended for affluent households. This elimination corresponded to the repeal of the relevant paragraph in Article 7 of the VAT Code. It formed part of a broader policy of rationalizing VAT rates, aimed at: reducing the number of applicable rates in order to simplify taxation, avoiding the proliferation of intermediate rates, which can create errors or opportunities for tax arbitrage and broadening the tax base by applying the standard rate to a larger number of activities and goods. In the Tunisian context, this elimination fits

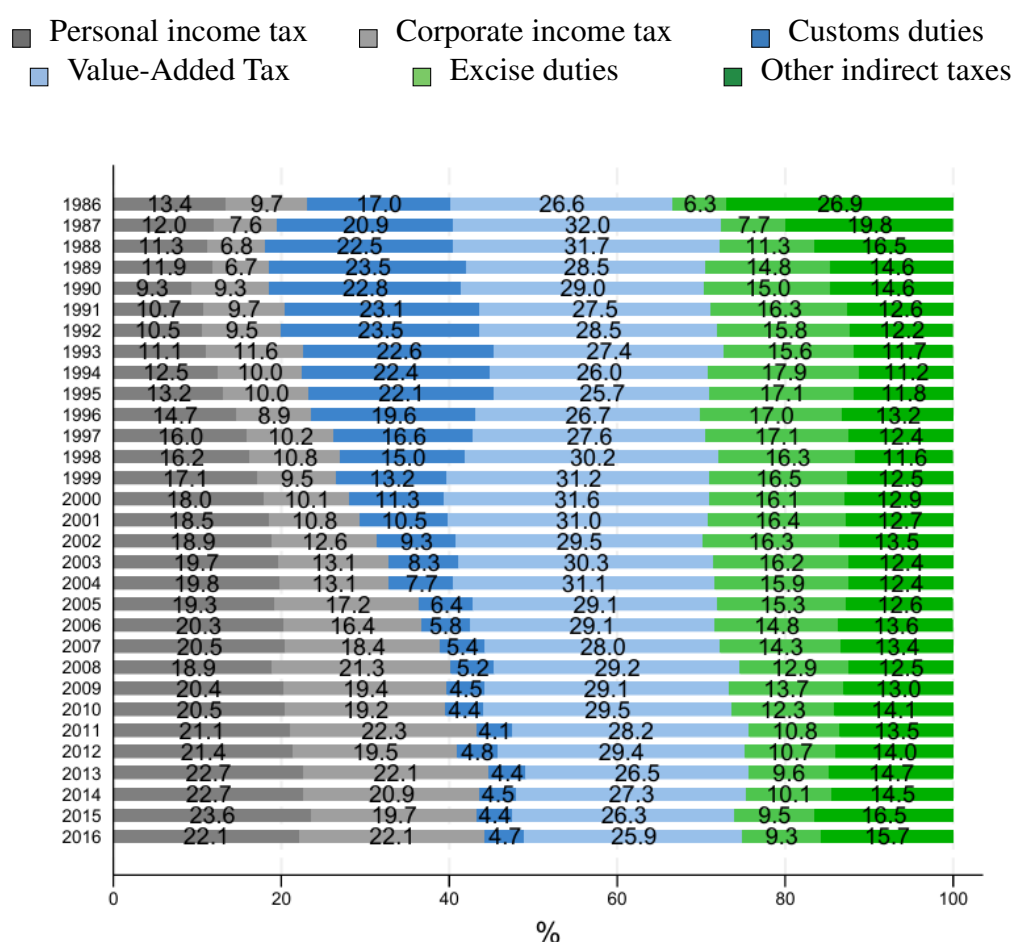


Figure 3.2: Evolution and structure of tax revenues in Tunisia

Author's calculation. Source: Ministry of Public Finance of Tunisia

into a wider movement of VAT reform, as reflected in the 2023 Finance Law, which seeks to unify the rates at 19% (standard) and 7% (reduced), while gradually phasing out certain intermediate rates such as the 13% rate. This evolution has helped reduce interpretation difficulties and disputes between the tax administration and businesses. A slight increase in the VAT-to-GDP ratio can be observed following these adjustments.

These two graphs above (Figures 3.5 and 3.6) illustrate the evolution of the shadow economy and investment in Tunisia between 1986 and 2016, two key dimensions for understanding the economic effects of the introduction and functioning of the VAT system. The first graph shows that the size of the shadow economy, measured as a percentage of GDP and through a composite index, remained high at

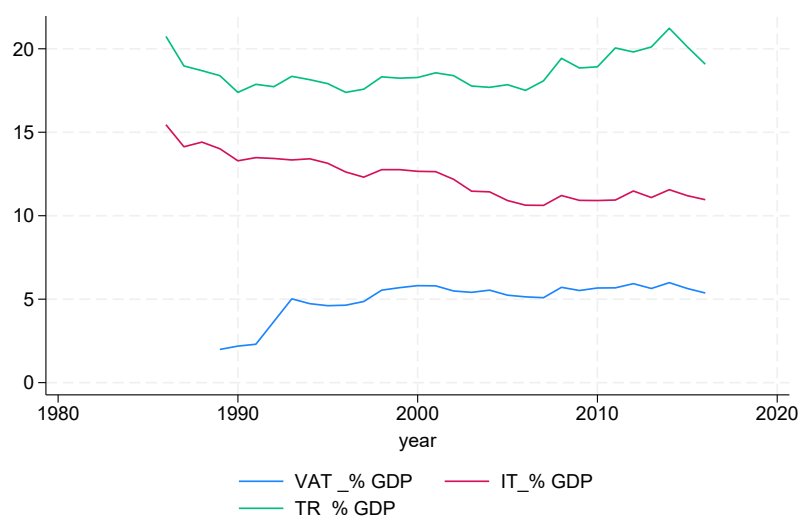


Figure 3.3: Evolution of tax revenues, indirect taxes and VAT in % GDP in Tunisia during 1986-2016

Author's calculation. Source: Ministry of Public Finance of Tunisia

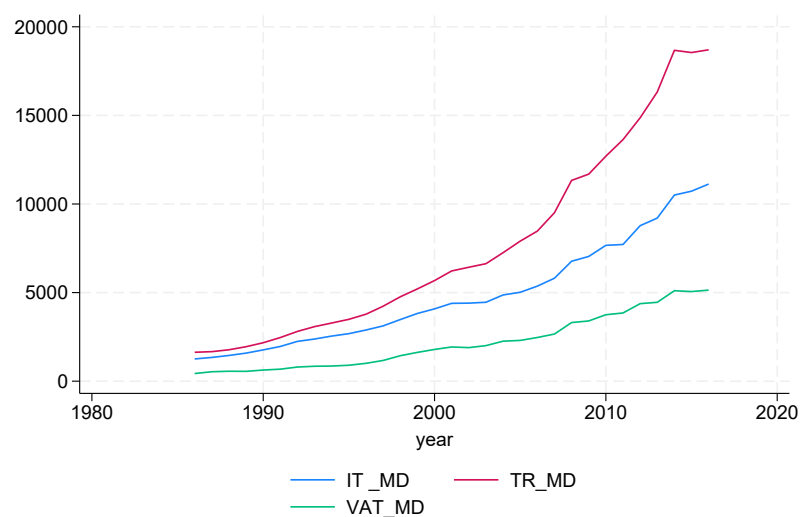


Figure 3.4: Evolution of tax revenues, indirect taxes and VAT in Millions of Dinars in Tunisia during 1986-2016

Source: " Ministry of Public Finance of Tunisia and UNU-WIDER "

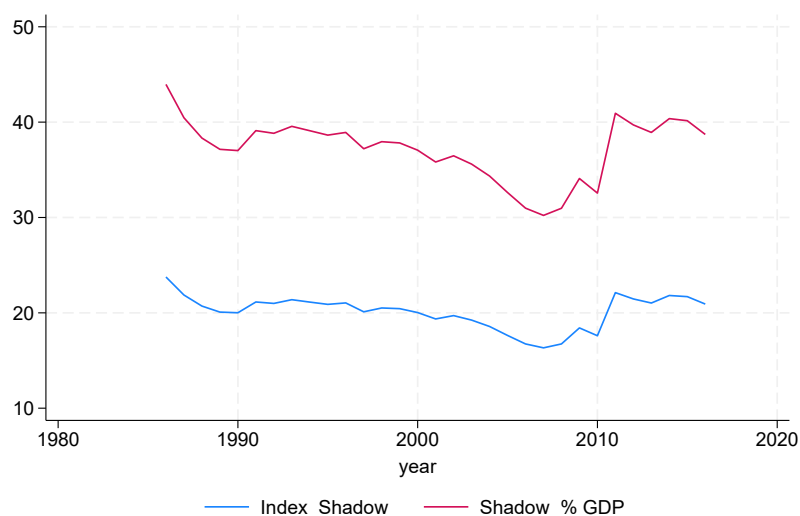


Figure 3.5: Evolution of Shadow Economy index and Shadow Economy % GDP in Tunisia during 1986-2016

Source: "OUERGHI and KACEM (2021)"

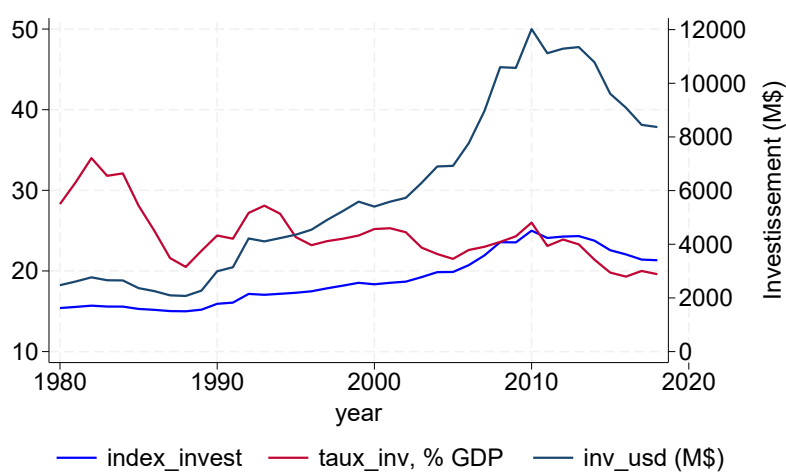


Figure 3.6: Evolution of investment in Tunisia during 1986-2018

Source: "Ibn Khaldun Forum for Development"

the end of the 1980s, then gradually declined during the 1990s and early 2000s before rising again after 2010. This pattern reflects a temporary improvement in economic formalization following fiscal reforms and macroeconomic stabilization, but also highlights the difficulty of sustaining these gains in the face of subsequent economic and institutional shocks, especially after the 2011 Revolution. The second graph illustrates the evolution of investment, showing moderate growth in the 1990s, a strong increase in value between 2000 and 2010, and a sharp decline after 2011. These trends mirror the influence of economic and financial cycles on investment capacity, as well as the indirect impact of fiscal frameworks and institutional confidence on capital formation. Overall, the graphs suggest that the initial positive effects of the VAT on formal activity and investment were temporary, as macroeconomic volatility and structural weaknesses in the Tunisian economy gradually eroded these early gains.

3.3 Related Literature

This section is divided into three parts, corresponding to the Theoretical foundations of Value-added taxes and economic efficiency, VAT in the MENA Region and a review of empirical literature.

3.3.1 VAT and labor productivity: theoretical mechanisms

The conceptual origins of the VAT can be traced to Wilhelm Von Siemens, who proposed it as a more efficient alternative to the German turnover tax. Its practical formulation and implementation are credited to Maurice Faure and Carl Shoup, who oversaw its introduction in France in 1954, making it the first country to apply VAT comprehensively across all sectors (Smith, Islam, and Moniruzzaman 2011). From the outset, VAT proved to be a reliable source of government revenue. Its relative simplicity, transparency, and capacity to prevent cascading taxation contributed to its rapid diffusion and eventual adoption by numerous countries worldwide. Today, VAT is widely regarded as one of the most significant fiscal innovations, having replaced less efficient turnover taxes in many systems due to its neutrality, administrative practicality, and revenue generating efficiency (M. Keen and Lockwood 2010).

The theoretical rationale for VAT aligns with core principles in public finance, particularly the production efficiency theorem of P. A. Diamond and Mirrlees (1971), which emphasizes that tax systems

even in second best environments should be structured to avoid distorting firms' production decisions . VAT also draws on the principle of tax neutrality, as it is levied only on final consumption and allows for input tax credits along the production chain, reducing distortions relative to turnover or income taxes (Martinez-Vazquez and R. M. Bird 2011)

The conceptual foundation of the link between VAT and labor productivity can be formalized through a standard production function of the following form:

$$y_{it} = A_{it} f(k_{it}, h_{it}),$$

where y_{it} is output per worker in country i at time t , A_{it} denotes total factor productivity (TFP), k_{it} is the stock of physical capital per worker, and h_{it} represents the average human capital per worker. Within this framework, VAT adoption is hypothesized to influence economic efficiency and thus labor productivity primarily through its effect on A and k .

Replacing distortionary turnover or sales taxes with VAT reduces cascading taxation and restores neutrality in firms' production decisions. Under turnover taxes, firms often allocate resources based on tax considerations, such as vertical integration to avoid multiple taxation, rather than efficiency. With VAT, which exempts intermediate goods through the credit invoice mechanism, profit-maximizing firms allocate inputs to their most productive uses. This increases allocative efficiency and, ultimately, TFP. As P. A. Diamond and Mirrlees (1971) argued, production efficiency is a necessary condition for optimal taxation, and VAT embodies this principle, provided it is well designed and properly enforced.

A second channel concerns the accumulation of capital. Since investment goods are untaxed under VAT, the cost of capital falls relative to a turnover tax regime. This removal of bias against capital-intensive production encourages companies to invest in machinery, equipment, and modern technologies, leading to an increase in the capital labor ratio (K/L). Over time, higher capital intensity translates into higher output per worker.⁴

VAT also affects firm organization by making vertical integration decisions tax neutral. Under turnover taxes, firms often preferred to internalize production stages to minimize tax burdens. VAT

⁴Total factor productivity may also be viewed as an indicator of economic efficiency. Its role as a determinant of GDP per worker arises naturally from the definition of the production function.

eliminates this incentive, allowing firms to outsource or specialize according to comparative advantage. This fosters specialization, economies of scale, and productivity gains. In addition, VAT reduces distortions across asset types and firm characteristics (e.g., financing methods, firm size, or degree of informality), thereby contributing further to efficiency improvements.

3.3.2 VAT in MENA countries

The MENA region's VAT experience is heterogeneous. Morocco (1986) and Tunisia (1988) were early adopters, followed by Egypt (1991) and Jordan (1994; extended to services in 2000). In each case, VAT replaced turnover or general sales taxes, which produced cascading administrative complexity and inefficiencies. By contrast, Lebanon (2002) and the Gulf Cooperation Council (GCC) countries: Saudi Arabia, the United Arab Emirates, Bahrain, Oman, and Qatar introduced VAT directly without a prior, structured turnover-tax system, often as part of fiscal diversification strategies. These initial conditions are crucial in explaining why VAT reforms have yielded uneven outcomes across the region (Mansour [2015](#)).

In Tunisia, the 1988 reform was pivotal: it abolished a turnover-tax system with 45 different rates and replaced it with a VAT featuring just three rates (6%, 17%, and 29%). This created a simpler, more neutral, and more transparent framework, limited distortions, and improved compliance through early administrative modernization and active communication. By contrast, Morocco adopted VAT gradually while retaining multiple rates and exemptions a standard rate of 20% and reduced rates of 7%, 10%, and 14%. Combined with restrictions on input-credit refunds, this continued to distort prices, lower efficiency, and raise administrative burdens, despite recent simplification efforts.

VAT administrations in Morocco and Tunisia are relatively advanced compared with others in the region. IMF staff assessments put the domestic VAT efficiency ratio at roughly 65 percent about the level of Portugal. Gains are feasible but likely gradual, contingent on stronger institutions, modernized systems and procedures, and enhanced staff skills. Medium-term improvements are more likely if administrative upgrades are coupled with structural simplification fewer rates, fewer exemptions, and a broader base. A 10-point rise in VAT efficiency would yield nearly 1 percent of GDP in additional revenue in both countries (Abed [1998](#)).

Egypt introduced a general sales tax in 1991 with numerous exemptions and weak redistributive effects, which narrowed the base and increased complexity, before adopting a more comprehensive modern VAT in 2016. Jordan implemented a general sales tax in 1994, extended to services in 2000, which helped raise tax revenue but remained burdened by multiple exemptions, enforcement difficulties, and fraud risks.

Lebanon, for its part, introduced a VAT directly in 2002 with a single 10% rate (raised to 11% in 2017). Although it quickly became a major source of revenue, its effectiveness was limited by broad exemptions, high levels of tax evasion, and insufficient administrative capacity, while the heavy reliance on indirect taxes reinforced regressive effects on low- and middle-income households. In the GCC countries, VAT was introduced only between 2018 and 2021, mainly in response to oil shocks and with the goal of fiscal consolidation rather than efficiency gains; with rates ranging from 5% to 15% and regimes marked by broad exemptions, these systems remain limited in scope. A useful comparison can be made with Ghana, which introduced VAT in 1995, but the reform collapsed within months due to inadequate public communication, strong political resistance, and an underprepared administration. The tax was relaunched in 1998 with improvements in design, enforcement, and outreach, including the introduction of e-services, but administrative complexity and the proliferation of exemptions continue to reduce its effectiveness. The Ghanaian case shows that the success of a VAT reform depends not only on legal design but also on institutional capacity and public buy-in, which helps explain why Tunisia, unlike most of its MENA peers, achieved tangible efficiency and productivity gains (Chapman 2001). Overall, VAT in MENA countries faces common structural challenges narrow bases, weak audit capacity, a large informal sector, and political resistance that limit its potential to improve efficiency. Tunisia is nonetheless an exception: by replacing a particularly distortionary turnover tax system with a relatively broad and neutral VAT, supported by early modernization of the tax administration and active stakeholder engagement, it succeeded in improving resource allocation and compliance. This explains why Tunisia is one of the few countries in the region where VAT reform is associated with measurable positive effects on labor productivity, highlighting the importance of initial conditions, design quality, and institutional capacity for the success of this type of reform.

3.3.3 Overview of empirical research

Empirical analysis of the economic effects of VAT remains limited, but it increasingly examines the consequences for efficiency and key macroeconomic aggregates. The existing literature reports heterogeneous results contingent on the country's level of development and prevailing economic imperfections, such as tax evasion and multiplicity of VAT rates. Some studies find that VAT can have significant positive effects on the economy, particularly in developed countries: United States (Ballard, Scholz, and Shoven 1987), Canada (Piggott and Whalley 2001; Smart and R. M. Bird 2009), Germany (Boeters et al. 2010), and Norway (Bye, Strøm, and Åvitsland 2003). However, these gains diminish when models incorporate realistic imperfections. Consistent with this, Ballard, Scholz, and Shoven (1987) estimates that a European-style VAT in the United States would cut welfare gains by 50–70% relative to a broad-base, single rate system, while Matthews (2003) shows that VAT efficiency declines as rates rise because of base erosion and greater evasion and avoidance. Accounting for the informal economy, Piggott and Whalley (2001) show that broadening the VAT base to services can reduce welfare. These findings suggest that a narrow base and informality constrain VAT efficiency, even in high-income countries.

On the other hand, other studies report limited or insignificant VAT effects, especially in developing economies. Ufier (2017), using a sample of mostly developing and emerging countries, reports that VAT adoption did not raise the tax-to-GDP ratio but did reduce government spending, deficits, and public debt. Adhikari (2020) finds that the effect of VAT on economic efficiency, measured by labor productivity, is limited in almost all developing countries and nonsignificant through the two transmission channels: capital stock and total factor productivity. While more recent works on China indicate that the shift from the Business Tax to VAT has boosted fixed-capital investment, R&D spending, and sectoral specialization (Xing et al. 2022; Yu and Qi 2022).

Most VAT studies proxy economic efficiency with the tax-to-GDP ratio, an at-best indirect measure (Adhikari 2020). To our knowledge, no work examines VAT's effect on economic efficiency in Tunisia. Following Adhikari (2020), we use labor productivity as the primary metric and examine two mechanisms: total factor productivity and capital stock. For identification, we apply the Synthetic Control Method (SCM). Unlike Adhikari (2020), who implements SCM across many treated countries

grouped by income level, we focus on a single country. VAT effects likely depend on fiscal-institution quality, administrative capacity, tax compliance, and the degree of informality, which vary widely and are hard to measure consistently across countries. A single-country SCM minimizes this cross-country heterogeneity and improves interpretability.

3.4 Data and Methodology

3.4.1 Why Synthetic Control Method?

We use the SCM to estimate how Tunisia's output per worker would have evolved without the introduction of the VAT. SCM allows us to isolate the effect of VAT by comparing Tunisia's actual outcomes to those of a synthetic control unit, a weighted combination of countries that did not implement VAT during the same period. This comparison provides a credible counterfactual necessary for causal inference.

Tunisia introduced VAT in 1988 as part of a broader structural adjustment program supported by the IMF and World Bank. This program included trade liberalization, and public sector reforms, all of which could affect output per worker independently of VAT. Observed changes in output per worker after the reform may therefore reflect the combined influence of multiple policies. SCM helps address this by identifying a synthetic Tunisia that matched the country's pre-reform characteristics but did not experience similar changes. This enables a clearer estimate of the effect of VAT on output per worker, separate from the impact of other concurrent reforms.

Originally proposed by Abadie and Gardeazabal (2003) and further developed in subsequent research by Abadie, A. Diamond, and Hainmueller (2010) and Abadie, A. Diamond, and Hainmueller (2015), the Synthetic Control Method (SCM) has emerged as a widely adopted tool in empirical policy evaluation. Its increasing popularity stems from its methodological robustness and applicability across a broad range of policy contexts. As noted by Athey and Imbens (2017), SCM stands out as one of the most notable methodological contributions to the field in recent decades. A key benefit of SCM is its objective and data-driven approach to constructing counterfactual outcomes, which helps overcome the subjectivity that often characterizes the selection of control groups in traditional case study designs.

As noted by Abadie, A. Diamond, and Hainmueller (2010), selecting an appropriate comparison group in traditional case studies often involves a high degree of subjectivity, relying heavily on the researcher's perception of similarity between treated and control units. The SCM mitigates this issue by constructing a synthetic counterpart through a transparent, data driven process. This synthetic unit is formed as a weighted average of unaffected units typically drawn from the same income category, such that the resulting combination closely replicates the pre-intervention characteristics of the treated unit. The weights are optimized to ensure that, on average, the synthetic control matches the treated unit in terms of both outcome variables and relevant covariates before the intervention.

The Synthetic Control Method (SCM) is particularly effective in mitigating potential endogeneity concerns stemming from omitted variable bias. As shown by Abadie, A. Diamond, and Hainmueller (2010), when the synthetic control closely reproduces the pre-intervention trajectory of the treated unit's outcome, the influence of time-varying unobserved confounders is significantly reduced. This bias tends to diminish further as the length of the pre-treatment period increases, since only units with similar observed and unobserved predictors as well as similar relationships between those predictors and the outcome are likely to display parallel trends over time. To minimize such biases in our own analysis, we rely on a pre-treatment fit index to select cases where the treated unit and its synthetic counterpart exhibit a very close match prior to the intervention.

SCM also provides transparency in the construction of the counterfactual by explicitly reporting the weights assigned to each control unit. This allows researchers to assess both quantitative and qualitative similarities between the treated unit and the synthetic control. In contrast, traditional regression-based approaches such as difference-in-differences (DID) typically generate counterfactuals using an implicit average of all control units, conditional on covariates. These implicit weights are rarely disclosed, making it difficult to evaluate the credibility of the comparison. SCM's use of a weighted combination of similar units offers a more interpretable and potentially more reliable counterfactual.

Moreover, as Bertrand, Duflo, and Mullainathan (2004) highlight, DID estimators applied over long time horizons often suffer from understated standard errors due to serial correlation. SCM addresses this concern through placebo-based inference procedures, which remain valid even in the presence

of autocorrelated errors. Unlike standard t-tests, these methods do not rely on strong parametric assumptions, reducing the likelihood of over-rejecting the null hypothesis.

Despite its advantages, SCM is not without limitations. First, it does not fully eliminate all sources of endogeneity, particularly reverse causality. In many cases, policy reforms are adopted with future economic conditions in mind. If these anticipatory expectations are not captured by unobserved factors in the model, the estimated treatment effects may be biased. Second, the credibility of SCM hinges on the quality of the donor pool. Ideally, the control group should consist of countries that did not experience major structural shifts during the study period. While we exclude countries undergoing significant policy changes, some donor units may have implemented minor reforms or growth oriented policies that could influence the outcome variable over time. In such cases, the estimated effect of the primary reform may be understated. Conversely, if control countries are affected by negative idiosyncratic shocks in the post-reform period, this may lead to an overestimation of the treatment effect.

Another assumption of SCM is the absence of anticipation effects; that is, key economic variables should not respond before the policy is formally enacted. If economic agents anticipate a forthcoming reform and adjust their behavior in advance (e.g., by delaying investment or hiring), this could contaminate the post-treatment estimates. Lastly, SCM yields reduced-form estimates of the aggregate impact of the reform. As such, the method does not provide direct insights into the underlying transmission mechanisms through which the reform affects economic efficiency.

3.4.2 Synthetic Control Method

Assume a framework with $J + 1$ countries, where unit 1 represents the treated country that implements a structural reform beginning in period $T_0 + 1$. The remaining J countries form the donor pool and serve as potential controls. Let T_0 denote the number of time periods before the intervention, satisfying $1 \leq T_0 \leq T$. Define Y_{it}^{NR} as the outcome that would be observed for unit i at time t in the absence of the reform (no reform), and let Y_{it}^R represent the observed outcome under the reform. The observed outcome for unit i at time t can then be expressed as:

The realized outcome for unit i at time t can be represented as follows:

$$Y_{it} = \begin{cases} Y_{it}^{NR} & \text{if the unit is not exposed to the reform} \\ Y_{it}^{NR} + \tau_{it} D_{it} & \text{if the unit is affected by the reform} \end{cases}$$

Here, $\tau_{it} = Y_{it}^R - Y_{it}^{NR}$ represents the treatment effect of the reform for unit i at time t . The indicator variable D_{it} equals 1 when unit i is exposed to the reform (that is, $i = 1$ and $t > T_0$), and 0 otherwise. For the treated unit, the observed outcome corresponds to Y_{it}^R . However, the counterfactual outcome Y_{it}^{NR} what would have occurred in the absence of the reform remains unobserved and must be estimated.

To approximate this counterfactual, we rely on a linear factor model that allows for both observed and unobserved determinants of the outcome to vary over time. The model is specified as follows:

$$Y_{it}^{NR} = \alpha_t + \theta_t Z_i + \lambda_t \mu_i + \varepsilon_{it}$$

Where α_t is an unknown common factor with constant factor loadings across countries, Z_i is a vector of observed covariates with coefficients θ_t , μ_i is a $(F \times 1)$ vector of unknown parameters, λ_t is a $(1 \times F)$ vector of unobserved common factors, and ε_{it} are idiosyncratic error terms with zero mean. It is important to highlight that this model specification permits the influence of unobserved confounding factors to evolve over time, as captured by the interaction term $\lambda_t \mu_i$. In contrast to standard difference-in-differences (DID) approaches which permit the presence of unobserved confounders but assume their effects remain constant over time, typically represented by a fixed term such as $\lambda \mu_i$, the synthetic control framework allows these effects to vary dynamically across periods.

A synthetic control is constructed as a weighted combination of the control units from the donor pool. Formally, this synthetic unit is represented by a $J \times 1$ vector of weights, $W = (w_2, \dots, w_{J+1})'$, where each weight $w_j \geq 0$ for $j = 2, \dots, J+1$, and the weights sum to one: $w_2 + \dots + w_{J+1} = 1$. This vector defines the relative contribution of each control unit to the synthetic counterpart. The predicted outcome for the synthetic control at time t is then calculated as:

$$\sum_{j=2}^{J+1} w_j Y_{jt} = \alpha_t + \theta_t \sum_{j=2}^{J+1} w_j Z_j + \lambda_t \sum_{j=2}^{J+1} w_j \mu_j + \sum_{j=2}^{J+1} w_j \varepsilon_{jt}$$

Now suppose that there are $(w_2^*, \dots, w_{J+1}^*)'$, such that the following holds.

$$\sum_{j=2}^{J+1} w_j^* Y_{j1} = Y_{11}, \dots, \sum_{j=2}^{J+1} w_j^* Y_{jT_0} = Y_{1T_0}, \sum_{j=2}^J w_j^* Z_j = Z_1$$

Thus, the treatment effect at time $t \in \{T_0 + 1, \dots, T\}$ can be estimated by:

$$\hat{\tau}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}$$

To find the optimal weights, let the $(T_0 \times 1)$ vector $K = (k_1, \dots, k_{T_0})'$ define a linear combination of pre-intervention outcomes, $\bar{Y}_j^k = \sum_{s=1}^{T_0} k_s Y_{js}$, where j belongs to $\{1, \dots, J+1\}$, $j = 1$ denotes treated country and $j \neq 1$ denote donor countries. Consider M of such linear combinations defined by the vectors $(K_1, \dots, K_M)$. Let X_1 be $(Z_1', \bar{Y}_1^{K_1}, \dots, \bar{Y}_1^{K_M})'$, the vector of pre-treatment variables that we aim to match as closely as possible for the treated country. Let X_0 be the matrix where each column of the matrix is a vector of same pre-treatment variables for each potential donor country. The synthetic control algorithm chooses W^* to minimize the distance $\|X_1 - X_0 W\|_V = \sqrt{(X_1 - X_0 W)' V (X_1 - X_0 W)}$, where V is a symmetric, positive semi-definite and diagonal matrix such that the mean square prediction error (RMSPE) of the outcome variable is minimized for the pre-intervention periods. Note that the inferential procedure is valid for any choice of V ; however, by minimizing the RMSPE, the algorithm assigns larger weights to those pre-treatment variables that have the highest predictive power.⁵

3.4.3 Pre-Treatment Fit Index

To evaluate whether the synthetic control constructed via SCM serves as a reliable counterfactual, it is essential to assess how closely it replicates the treated unit's characteristics prior to the intervention. Abadie, A. Diamond, and Hainmueller (2010) propose using the root mean square prediction error (RMSPE) of the outcome variable as a measure of pre-treatment fit. This metric captures the degree of similarity or discrepancy between the outcome trajectory of the treated unit and that of its synthetic counterpart, and is defined as follows:

$$RMSPE = \sqrt{1/T_0 \sum_{t=1}^{T_0} (Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt})^2}$$

However, to evaluate the overall quality of the pre-treatment match, we rely on the "pre-treatment fit index" introduced by Adhikari and Alm (2016). This index offers two key advantages. First, it normalizes the root mean square prediction error (RMSPE), enabling meaningful comparisons of pre-treatment fit across different outcome variables and countries particularly useful when variables like GDP per capita differ substantially between high-income and low-income economies. Second, the index

⁵See Appendix V in Abadie and Gardeazabal (2003) for more details.

yields a single, intuitive value that simplifies the assessment of fit quality. The benchmark RMSPE used in this context corresponds to that obtained from a zero-fit model, serving as a reference point for evaluating the relative fit of the synthetic control, or:

$$\text{Benchmark RMSPE} = \sqrt{1/T_0 \sum_{t=1}^{T_0} (Y_{1t})^2}$$

The pre-treatment fit index is calculated as the ratio between the root mean square prediction error (RMSPE) and a benchmark RMSPE:

$$\text{Fit Index} = \frac{\text{RMSPE}}{\text{Benchmark RMSPE}}$$

This index provides a normalized measure of the similarity between the treated unit and its synthetic counterpart during the pre-intervention period. A fit index within the range $[0, X]$ implies that the RMSPE is equivalent to that produced when the discrepancy between the treated unit and the synthetic control is approximately X percent per pre-treatment year. A value of 0 for the RMSPE implies a perfect pre-treatment match, resulting in a fit index of 0. Conversely, if the RMSPE matches the benchmark RMSPE, the fit index equals 1, indicating a pre-treatment fit no better than a zero-fit model. When the fit index exceeds 1, it suggests that the treated and synthetic units differ substantially for example, when the outcome variable such as output per worker for the treated country is at least twice as large or small as that of its synthetic counterpart. In such cases, the synthetic control is considered a poor match and should be excluded from the analysis.

3.4.4 Inference

In comparative case studies where treatment assignment is limited to a small number of units and the available data set is of limited size, traditional inference techniques based on large-sample assumptions are often inappropriate. To overcome this limitation, placebo based inference procedures, as applied in Abadie and Gardeazabal (2003), Bertrand, Duflo, and Mullainathan (2004), and Abadie, A. Diamond, and Hainmueller (2010), offer an alternative method for assessing the statistical relevance of estimated effects.

The primary objective of placebo testing is to determine whether the observed impact of a policy intervention could have occurred purely by chance. This is achieved by repeatedly simulating treatment effects for each unit in the donor pool. Those countries that did not experience the actual reform by pretending they adopted the policy at the same time as the treated country. The Synthetic Control Method is applied in each case to generate a placebo effect, and the true treated unit is excluded from the donor pool in every iteration.

These placebo estimates form an empirical distribution of treatment effects under the null hypothesis of no intervention. If the treatment effect observed for the actual treated unit does not stand out from this distribution that is, if many placebo effects are of equal or greater magnitude then the result is interpreted as statistically insignificant. Conversely, if the estimated effect is unusually large compared to the distribution of placebo effects, it provides evidence consistent with a significant treatment impact.

One important caveat is that placebo tests cannot completely eliminate alternative explanations, such as the influence of unobserved, country specific shocks or other overlapping policy measures. These tests are limited to assessing how exceptional the estimated treatment effect is under the assumption of no reform. As a result, careful selection and construction of the donor pool is crucial to mitigate the influence of such confounding factors.

3.4.5 Treated unit and potential controls

In this study, the treatment of interest is the implementation of VAT. The treated country is Tunisia, which adopted VAT in 1988. We define the treatment date as the starting year of the reform episode. The selection of Tunisia as the treated unit satisfies three important conditions. First, the outcome variable and the relevant covariates are available over a sufficiently long time span. Second, because Tunisia implemented VAT in the 1980s, there are at least ten years of pretreatment data available to calibrate the path of the outcome variable using a synthetic control constructed from donor pool countries. Third, there exists a set of control countries that did not introduce VAT during or after Tunisia's VAT adoption, ensuring a reliable pool of potential control units for comparison.

Given these requirements, we used annual country-level data for the period 1970–2018. Tunisia is selected as the treated country, with VAT implementation in 1988 providing a preintervention period

of 18 years. Our sample period ends in 2018 because some countries in the control group began implementing VAT that year.

We exclude from the donor pool any countries that adopted a VAT within a 5-year window before or after the treatment year. This restriction ensures that the synthetic control accurately replicates the trajectory of the outcome variable of the treated unit in the absence of the intervention, as the presence of similar reforms in donor units could bias the estimated counterfactual. The synthetic counterpart to Tunisia's VAT adoption is then generated as a weighted combination of selected control units from the donor pool.

Initially, we considered working for a long period of time. However, we found that countries without VAT as of 2018 were mainly high-income countries (such as GCC members) and a few low-income countries. Many of these low-income countries are small countries which also face serious data availability issues, with only a handful having reliable data. This made them unsuitable as controls for our treated country, which is a lower-middle-income economy according to the World Bank income classification.

We also realized that it was not necessary to adopt a long time horizon to evaluate the impact of VAT introduction on labor productivity a few years or a short-term window is sufficient. To balance our donor pool, we therefore included countries that did not have VAT until 2000.⁶

Although the sample remains heterogeneous, the average labor productivity of the donor pool (excluding Tunisia) is fairly close to that of Tunisia. A similar pattern holds for the size of the informal economy.⁷

3.4.6 Variables and Data sources

We provide a list of all variables used in the analysis in Table 3.1 and their definitions in Table 3.2, along with their respective data sources. Since our primary objective is to assess the impact of VAT

⁶Angola (2019), United Arab Emirates (2025), Bahrain (2018), Botswana (2002), Costa Rica (2019), Egypt (2016), Jordan (2001), Kuwait (2027), Myanmar (No VAT), Malaysia (No VAT), Qatar (2027), Rwanda (2001), Saudi Arabia (2018), Hong Kong (No VAT), and the Democratic Republic of Congo (2012). We subsequently dropped the UAE, Qatar and Kuwait in order to make the donor pool economically closer to Tunisia.

⁷The unified VAT agreement to implement the VAT signed by GCC member states in 2018 by UAE and Saudi Arabia which were followed by Bahrain in January 2019. As for Kuwait, Qatar and Oman is still under review (Mansour, 2015)

implementation on Tunisia's economic efficiency, we first collected information on the years of VAT adoption from various sources, including PwC, the United Nations' Fiscal Policy Review of Arab States (2019), national legislation, and VAT Calc⁸. Within the synthetic control method (SCM) framework, treatment is defined as the introduction of VAT in a country during a period in which no VAT had previously been in place.

Table 3.1: Descriptive Statistics

Variables	N	Mean	SD	Min	Max
Ln_output_worker	465	9.515	1.266	6.696	12.037
Ln_capital_stock_worker	465	10.091	1.677	5.903	12.696
Human capital	465	1.654	0.447	1.000	2.703
Trade	465	0.004	0.007	-0.009	0.031
Population	465	12.546	15.315	0.220	69.000
Electoral Democracy Index	465	0.224	0.226	0.009	0.897
Inflation	465	0.237	2.397	-9.847	17.779
Total Factor productivity	341	1.417	1.051	0.360	7.883

Table 3.2: Summary of Variables

Variables	Description	Sources
Ln_output_worker	Log output per worker (output-side, constant 2017 prices)	Penn World Table, v10.01
human capital	Human capital index (schooling & returns to education)	Penn World Table, v10.01
Ln_capital_stock_worker	Log capital stock per worker (constant 2017 prices)	Penn World Table, v10.01
TFP	TFP at constant national prices (2021=1)	Penn World Table, v10.01
Trade	Trade openness (exports + imports as a share at current PPPs)	Penn World Table, v10.01
Inflation	Inflation rate (GDP deflator, annual %)	Penn World Table, v10.01
Pop	Population (millions)	Penn World Table, v10.01
GDP_capita_growth	Real GDP growth	Penn World Table, v10.01
Polyarchy	Electoral democracy index (polyarchy)	Varieties of Democracy (V-Dem)

Source: See above and compilation by the authors.

⁸VATCalc usually refers to an online VAT calculation tool or a specialized tax software platform that automates the calculation of Value-Added Tax (VAT) for transactions.

The outcome variable in our study, Y_{jt} , is measured as output-side real GDP at chained PPPs (in millions of 2017 US dollars) per employee⁹¹⁰ in country j at time t . For the construction of the pre-intervention characteristics (X_1 for the treated unit and X_0 for the donor pool), we aimed to follow as closely as possible the standard set of labor productivity predictors commonly used in the literature, such as Adhikari (2020). However, the actual choice of variables was constrained by the availability of long-run data for Tunisia dating back to the 1970s. The covariates included in the predictor vector Z are as follows: Capital stock per worker, a key driver of productivity in a Solow-type growth framework, from the Penn World Table version 10.01, Human capital index, capturing the education and skills of the workforce, Trade openness, measured as exports plus imports over GDP ($\frac{X+M}{GDP}$), to account for international integration. Exports plus imports are also from the Penn World Table version 10.0. The more a country depends on primary-commodity exports, the higher its risk of industrial lag and lower labor productivity (Csordás 2018; Azenui and Rada 2021). According to a part of studies inflation brings the accumulation of capital to a standstill by reducing the incentive to work. These developments lead to a decrease in productivity (Jarrett and Selody 1982; Kumar, Webber, and G. Perry 2012). In addition, inflation is indicated to reduce labor productivity by causing inefficient mix of factor input, impairing the informative function of price signals, forcing the companies to make inefficient buffer stocks and to reduce research expenditures in the long-term, eroding tax reductions (Clark 1982). We compute inflation using the GDP deflator from the Penn World Table, since the WDI series contains extensive missing values,¹¹. Instead of the Polity2 index, we use the V-Dem Electoral Democracy Index as our measure of democracy. Unlike Polity2, which is limited in scope and based on an ordinal –10

⁹One of the most widely used measures of productivity is Gross Domestic Product (GDP) per hour worked, which captures the use of labor inputs more accurately than GDP per employee (Krugman 1994). However, the variable representing hours worked (AVH) is not available for several countries, including the treated country in our analysis.

¹⁰So we follow Inklaar and Timmer (2013). They argue that output-side real GDP per worker is a more relevant indicator of the country's production capacity than the usually used expenditure-side GDP per worker. Expenditure-side GDP measures a country's standard of living, which may differ from its productive capacity due to varying trade terms.

¹¹Since the Penn World Table (PWT) does not provide a direct measure of inflation, we construct an implicit inflation series using the GDP deflator. Specifically, by following Litra (2009) we compute the GDP deflator as the ratio of nominal GDP to real GDP, and then define inflation in year t as the year-on-year percentage change in this deflator:

$$\text{Inflation}_t = \left(\frac{\text{Deflator}_t}{\text{Deflator}_{t-1}} - 1 \right) \times 100.$$

to +10 scale, offers a continuous measure (0–1) constructed from multiple dimensions of electoral democracy, including suffrage, free expression, association rights, clean elections, and elected officials. This provides a broader and more precise proxy for democratic institutions in our analysis. Moreover, Polity2 does not provide coverage for certain political entities such as Hong Kong, which is included in our sample. Using Electoral Democracy Index therefore ensures full comparability across all countries studied. According to Ajide (2025), democracy enhances political and economic freedom and allows economic agents to exercise their free will as well as thoughts to be shared. This creates a conducive entrepreneurial environment for households and firms. Democracy allows citizens to seek and utilize economic and entrepreneurial opportunities, which finally boosts labor productivity in the economy. We also use Population as a rapid demographic expansion may dilute capital per worker (Paul M Romer 1990) and pre-treatment average of output per worker, included to capture baseline productivity levels. For the mechanism analyses, where the outcome is either capital stock per worker or TFP, we additionally follow Adhikari (2020) by using the pretreatment average of the mechanism variable itself and the pretreatment growth rate of real GDP per capita, alongside human capital, trade openness, inflation, democracy, and the same region/income-group indicators.¹²

3.5 Results and Discussion

Using the techniques of SCM, this chapter constructs a synthetic Tunisia with the weighted combination of control countries from the donor pool¹³. This section is divided into two subsections: the effect on labor productivity and the effect on transmission channels.

¹²When analyzing total factor productivity (TFP) as the dependent variable to capture the transmission channel through which VAT affects labor productivity, we exclude the Democratic Republic of Congo, Liberia, Myanmar, and Oman because no TFP data are available for these countries. For the remaining sample, we construct a balanced panel by filling gaps in the series: missing intermediate values are obtained using linear interpolation, while endpoints are completed using forward and backward extrapolation based on observed trends.

¹³This research implements SCM with the Stata command "Synth2" (Yan and Chen 2023)

3.5.1 The effect of VAT on Economic efficiency

Table 3.3 reports the weights assigned to each control country in the synthetic control. Seven countries receive positive weights, while the remaining seven obtain zero. The largest weight, 22.9 %, is assigned to Oman, indicating that its economic structure and pre-1988 performance most closely resemble Tunisia's according to the predictors and pre-treatment outcome. Other main contributors are Egypt (22.2 %), Costa Rica (18.2 %), Botswana (16.1 %), and Hong Kong (11.4 %), suggesting a diversified donor base rather than reliance on a single country.

Table 3.4 checks the balance of characteristics between actual Tunisia and its synthetic counterpart. Columns 1 presents names of covariates. Columns 2 and 4 are the simple averages of each covariate in the treated country (Tunisia) and all the control countries in the donor pool before 1988, while column 3 is the weighted averages of each covariate in synthetic Tunisia. It can be observed that large differences exist in each predictor between columns 2 and 4. However, comparing columns 2 and 3 shows smaller differences. Using weighted averages, SCM attains a good balance between actual Tunisia and its synthetic counterpart. The synthetic Tunisia is therefore reasonably constructed. We then compute the fit index as the ratio of the pre-treatment RMSPE to the benchmark RMSPE (the square root of the mean of the treated unit's pre-treatment outcome squared). The fit index equals 0.003, which represents about 0.3% of the benchmark per pre-treatment year. This indicates excellent pre-treatment fit. The next step is to compare the actual and synthetic trajectory of output per worker in Tunisia during the post-treatment period.

Figure 3.7 illustrates the trajectories of output per worker in Tunisia and its synthetic counterpart from 1970 to 2000. During the pre-treatment period (1970–1987), the path of synthetic Tunisia closely tracks that of actual Tunisia, confirming the validity of the counterfactual. After the introduction of VAT in 1988 (dotted vertical line), however, the trajectories diverge markedly. The actual GDP per worker in Tunisia follows an upward trend throughout the early 1990s, reaching a peak in the mid-decade but then displaying a gradual decline toward the end of the sample. In contrast, the synthetic trajectory shows a milder increase, producing a positive gap that reflects Tunisia's productivity gains after VAT adoption. The estimated treatment effects confirm this pattern. The gap between actual and synthetic output per worker rises steadily from 7.3 % in 1988 to about 29.7 % in 1996, reflecting Tunisia's productivity gains

Table 3.3: Country Weights

Country	Weight (%)	Country	Weight (%)
Oman (12)	22.90	Egypt (6)	22.20
Botswana (3)	16.10	Costa Rica (4)	18.20
Liberia (9)	5.8	Angola (1)	3.4
Bahrain (2)	0.0	D.R. Congo (5)	0.0
Hong Kong (7)	11.40	Jordan (8)	0.0
Malaysia (10)	0.0	Myanmar (11)	0.0
Rwanda (13)	0.0	Saudi Arabia (14)	0.0

Table 3.4: Balancing Properties

Covariate	Treated	Synthetic	Average Control
ln_output_worker (1970–1987)	9.687	9.686	9.466
pop	6.250	11.121	10.738
ln_cs_worker	10.079	9.964	9.818
Electoral Democracy Index	0.192	0.191	0.212
Inflation	0.145	0.145	0.296
hc	1.286	1.595	1.495
trade	0.004	0.004	0.004
RMSPE	0.037		
Benchmark RMSPE	9.687		
Fit index	0.003		

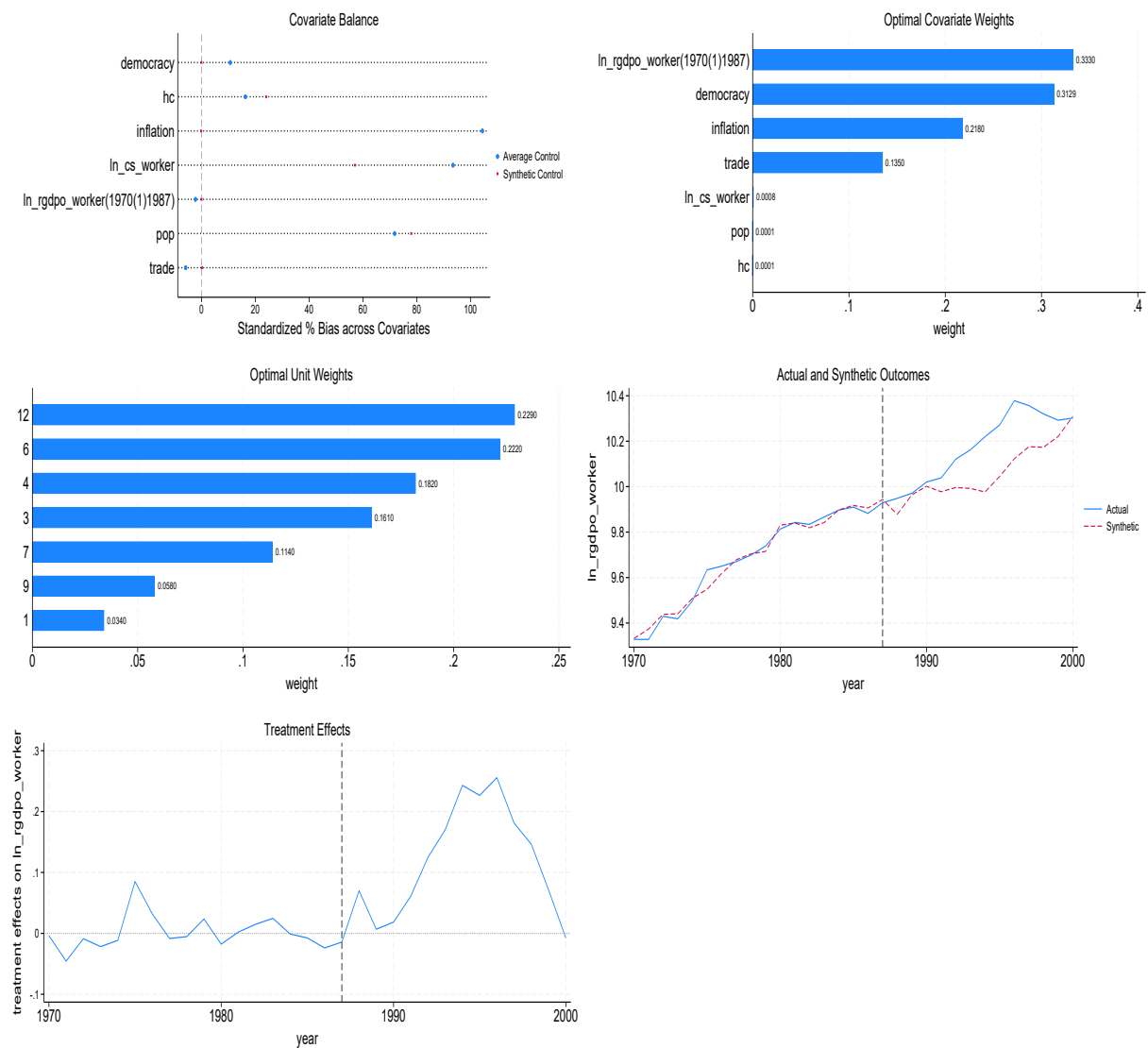


Figure 3.7: The gap in Real GDP per worker between actual and synthetic Tunisia

relative to the counterfactual without VAT. The effect then weakens after 1997 and becomes almost zero by 2000 (−0.8%), indicating that the early efficiency gains were temporary. On average, over the post-1988 period, the estimated treatment effect corresponds to a 12.8 % higher output per worker compared to the synthetic control (see Table 3.5).

By 2000, these productivity gains had largely dissipated, with the gap between actual and synthetic output per worker narrowing to nearly zero. This fading pattern is consistent with Adhikari (2020), who finds that VAT systems in developing economies often fail to sustain long-run efficiency improvements. Weak enforcement, widespread exemptions, refund delays, and a persistent informal sector gradually undermine compliance and erode the initial efficiency gains, transforming VAT from a neutral consumption tax into a production-distorting levy over time.

Second, the figure also contains several pieces of information. First, the optimal unit weights (w^*) indicate the contribution of donor countries to constructing synthetic Tunisia. Only a subset of countries receive positive weights, with Oman (Unit 12) having the largest weight (0.229) and Egypt (Unit 6) the second largest (0.222), reflecting their strong influence in replicating Tunisia's pre-treatment trajectory. Other contributing donor countries are Costa Rica (Unit 4), Botswana (Unit 3), Hong Kong (Unit 7), Liberia (Unit 9), and Angola (Unit 1), which also play a role, though with smaller weights. The remaining seven donor units receive zero weights and are therefore excluded from the construction of synthetic Tunisia.

Third, the optimal covariate weights (V^*) are displayed in a horizontal bar chart. These weights determine the relative importance of each predictor in minimizing the root mean squared prediction error (RMSPE) before treatment. The average of log output per worker in the pre-treatment period receives the largest weight (0.333), followed by the electoral democracy index (0.313), inflation (0.218) and trade (0.135) indicating that pre-treatment productivity levels, political institutions, inflation and trade are the most influential predictors in the matching process. Other covariates, such as the human capital index and population, play a comparatively modest role.

Fourth, the figure reports the covariate balance among the treated unit, the synthetic control, and the average control. The x-axis shows the standardized percentage bias across covariates, with the vertical line representing Tunisia. Blue dots denote the average control, and red crosses denote

the synthetic control. The synthetic control achieves a much better balance across most variables, particularly for the human capital index, the electoral democracy index, trade, and the average of log output per worker in the pre-treatment period, with points clustering close to zero.

Finally, the figure also presents the treatment effects, plotted as the gap between Tunisia and its synthetic counterpart. The curve is characterized by a small concave rise immediately after 1988, followed by a larger concave peak in the mid-1990s, before declining toward the end of the sample. This pattern illustrates the dynamics of the VAT effect: an initial gain that builds up, peaks, and then weakens by 2000. The table 3.5 below shows how economic efficiency evolved after the introduction of the Value-Added Tax (VAT) in 1988. The results indicate an average positive effect of 0.128 log points, equivalent to about 12–13% higher efficiency compared to the synthetic counterfactual without the reform. In the first few years following the VAT introduction, the effect remained modest, but the gap between the actual and synthetic outcomes gradually widened until the mid-1990s, reaching a peak of about 0.23 log points (roughly 23–26% higher efficiency). This pattern suggests that the VAT reform initially improved efficiency by simplifying the tax system and broadening the tax base. From 1997 onward, the effect began to decline and became nearly zero by 2000, indicating a stabilization period in which the initial efficiency gains of the reform diminished.

Table 3.5: Prediction results in the post-treatment periods (Economic efficiency)

Time	Actual Outcome	Synthetic Outcome	Treatment Effect
1988	9.949	9.854	0.095
1989	9.971	9.937	0.034
1990	10.021	9.978	0.042
1991	10.039	9.957	0.082
1992	10.121	9.976	0.145
1993	10.162	9.985	0.178
1994	10.220	9.993	0.227
1995	10.272	10.051	0.221
1996	10.379	10.147	0.232
1997	10.357	10.169	0.188
1998	10.320	10.173	0.147
1999	10.292	10.219	0.073
2000	10.302	10.303	-0.001
Mean	10.185	10.057	0.128

3.5.2 The effect of VAT through transmission channels

Capital stock

Table 3.6 reports the donor weights for capital stock. Six countries receive positive weights Hong Kong (33.0%), Botswana (23.5%), Egypt (19.2%), Jordan (15.5%), Saudi Arabia (5.4%), and Costa Rica (3.4%), while the others are zero. The largest weights go to Hong Kong and Botswana, indicating they best match Tunisia on predictors and the outcome in the pre-treatment period.

Table 3.7 assesses balance between actual Tunisia and its synthetic counterpart. Column 1 lists covariates; columns 2 and 4 report simple pre-1988 averages for the treated unit and the average of controls; column 3 gives the weighted averages for synthetic Tunisia. Large gaps appear between Tunisia and the average control, but the gaps are much smaller between Tunisia and the synthetic control, confirming good predictor balance under SCM. We then compute the fit index as the ratio of pre-treatment RMSPE to the benchmark RMSPE (the square root of the mean of the treated unit's pre-treatment outcome squared). The fit index is 0.005 ($\approx 0.5\%$ of the benchmark per pre-treatment year), indicating excellent pre-treatment fit. The next step is to compare post-1988 trajectories of capital per worker between actual and synthetic Tunisia.

Figure 3.8 and Table 3.8 show that following the introduction of the VAT in 1988, Tunisia experienced a clear and sustained increase in capital per worker relative to its synthetic counterpart. The gap rose from about 7% in 1988 to around 38% on average over the post-treatment period, before gradually narrowing toward 16% by 2000. This pattern suggests that VAT adoption was associated with stronger capital accumulation in the years following the reform, though the effect diminished over time.

Table 3.6: Country Weights (Capital stock)

Country/Unit	Weight (%)	Country/Unit	Weight (%)
Hong Kong (7)	33.0	Jordan (8)	15.5
Botswana (3)	23.5	Saudi Arabia (14)	5.4
Egypt (6)	19.2	Costa Rica (4)	3.4
Oman (12)	0.0	Angola (1)	0.0
Bahrain (2)	0.0	Rwanda (13)	0.0
D.R.Congo (5)	0.0	Liberia (9)	0.0
Malaysia (10)	0.0	Oman (12)	0.0
Rwanda (13)	0.0		

Table 3.7: Balancing Properties (Capital stock)

Covariate	Treated	Synthetic	Average Control
ln(capital/worker) (1970–1987)	10.079	10.080	10.057
inflation	-0.154	-0.163	-0.805
trade	0.004	0.003	0.004
growth_gdp_cap	8.129	8.070	4.586
hc	1.201	1.538	1.423
democracy	0.190	0.273	0.205
pop	5.606	9.640	7.926
RMSPE		0.047	
Benchmark RMSPE		10.079	
Fit index		0.005	

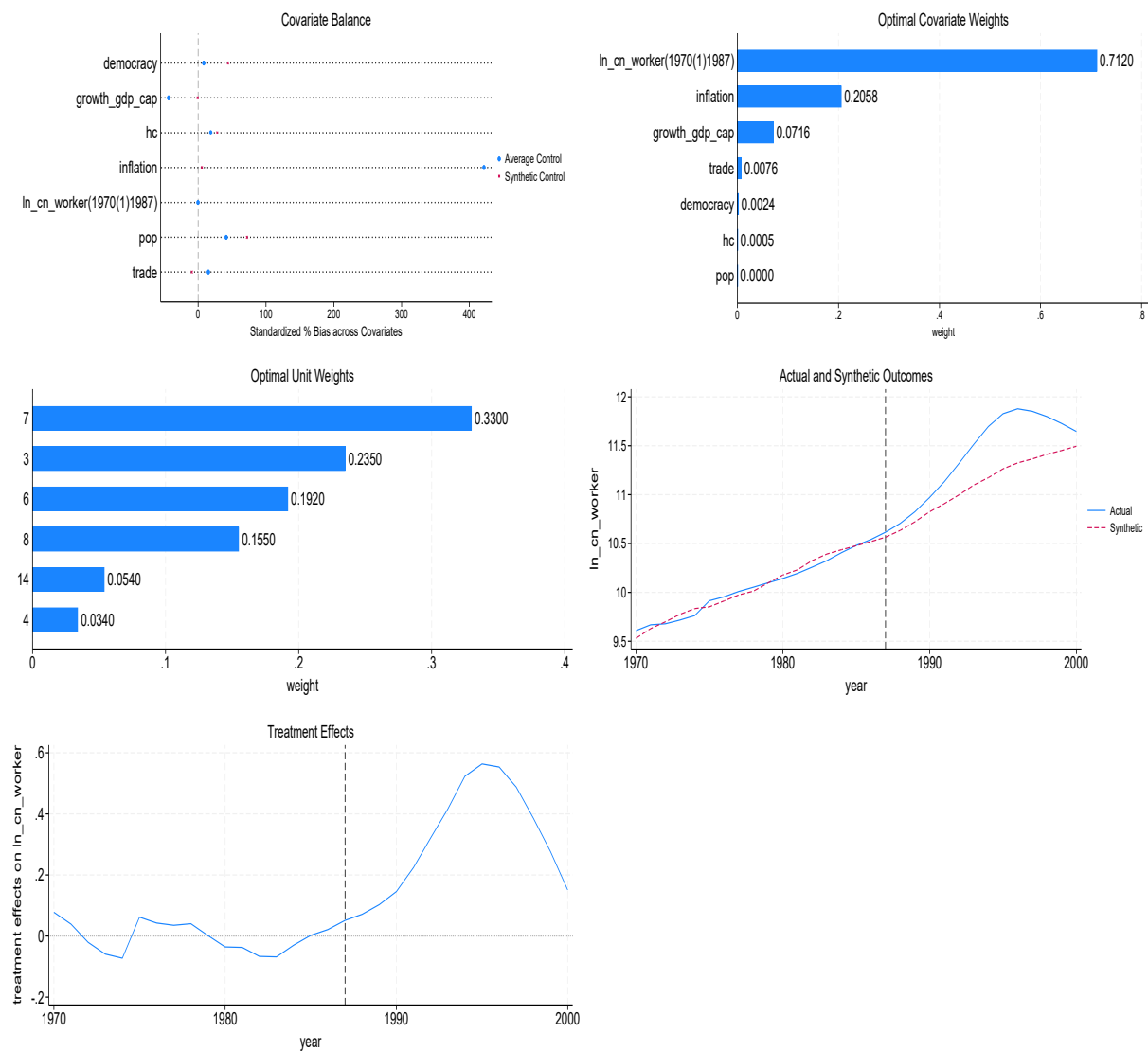


Figure 3.8: The gap in Capital stock per worker between actual and synthetic Tunisia

Table 3.8: Prediction Results in the Post-Treatment Periods (Capital per Worker)

Year	Actual Outcome	Synthetic Outcome	Treatment Effect
1988	10.706	10.635	0.071
1989	10.825	10.722	0.103
1990	10.971	10.825	0.146
1991	11.132	10.907	0.225
1992	11.319	10.998	0.321
1993	11.513	11.098	0.416
1994	11.697	11.173	0.523
1995	11.828	11.264	0.564
1996	11.878	11.325	0.554
1997	11.853	11.365	0.488
1998	11.799	11.413	0.386
1999	11.728	11.452	0.276
2000	11.646	11.495	0.151
Mean	11.454	11.129	0.325

Total Factor Productivity

From Table 3.9, we note that Synthetic control for TFP is dominated by one donor. Rwanda carries 65% of the weight, Hong Kong 19.6%, then Bahrain 5.5%, Botswana 5.1%, and Unit 6 4.8%; all others are zero. Balance is tight on the target and key predictors: TFP pre-1988 matches closely (0.980 vs 0.979), and gaps are small for population, trade, and the democracy index; differences are larger for human capital and inflation, though still far closer than the simple average control. Pre-treatment fit is moderate: RMSPE = 0.061 and fit index = 0.062, meaning the mismatch is about 6.2% of the benchmark per pre-treatment year adequate but not excellent (see Table 3.10). The high fit index reflects two factors. (1) A smaller donor pool: dropping countries with missing data for Total Factor Productivity weakens the synthetic mix and raises pre-treatment error. (2) Heavy reliance on Rwanda: extreme shocks in 1990–1994 (war and genocide). Results will be checked in the robustness section.

Table 3.11 and Figure 3.9 present the dynamic treatment effects of VAT adoption on total factor productivity (TFP) in Tunisia. The pattern shows that the impact did not occur immediately after the reform in 1988. During the first two to three years, the gap between actual and synthetic TFP remained small and statistically insignificant. Starting around 1991–1992, TFP in Tunisia began to rise relative to

Table 3.9: Country Weights (TFP)

Country	Weight (%)	Country	Weight (%)
Rwanda (13)	65.0	Angola (1)	0.0
Hong Kong (7)	19.6	Costa Rica (4)	0.0
Bahrain (2)	5.5	Jordan (8)	0.0
Botswana (3)	5.1	Malaysia (10)	0.0
Egypt (6)	4.8	Saudi Arabia (14)	0.0

its synthetic counterpart, indicating a delayed but sustained improvement. Five years after the reform, TFP was approximately 8–10 % higher than in the absence of VAT, and it continued to increase steadily until the mid-1990s. The estimated gap peaked around 1994, when Tunisia's TFP was about 55 % higher than that of the synthetic control. After this peak, the gains gradually declined but remained positive for the rest of the sample period, settling around 18 % above the counterfactual by 2000.

Table 3.10: Balancing Properties (TFP)

Covariate	Treated	Synthetic	Average Control
TFP (1970-1987)	0.980	0.979	1.684
pop	6.205	6.208	8.807
trade	0.004	0.004	0.003
hc	1.281	1.405	1.547
Electoral Democracy Index	0.192	0.192	0.175
Inflation	0.318	-0.036	0.781
RMSPE		0.061	
Benchmark RMSPE		0.979	
Fit index		0.062	

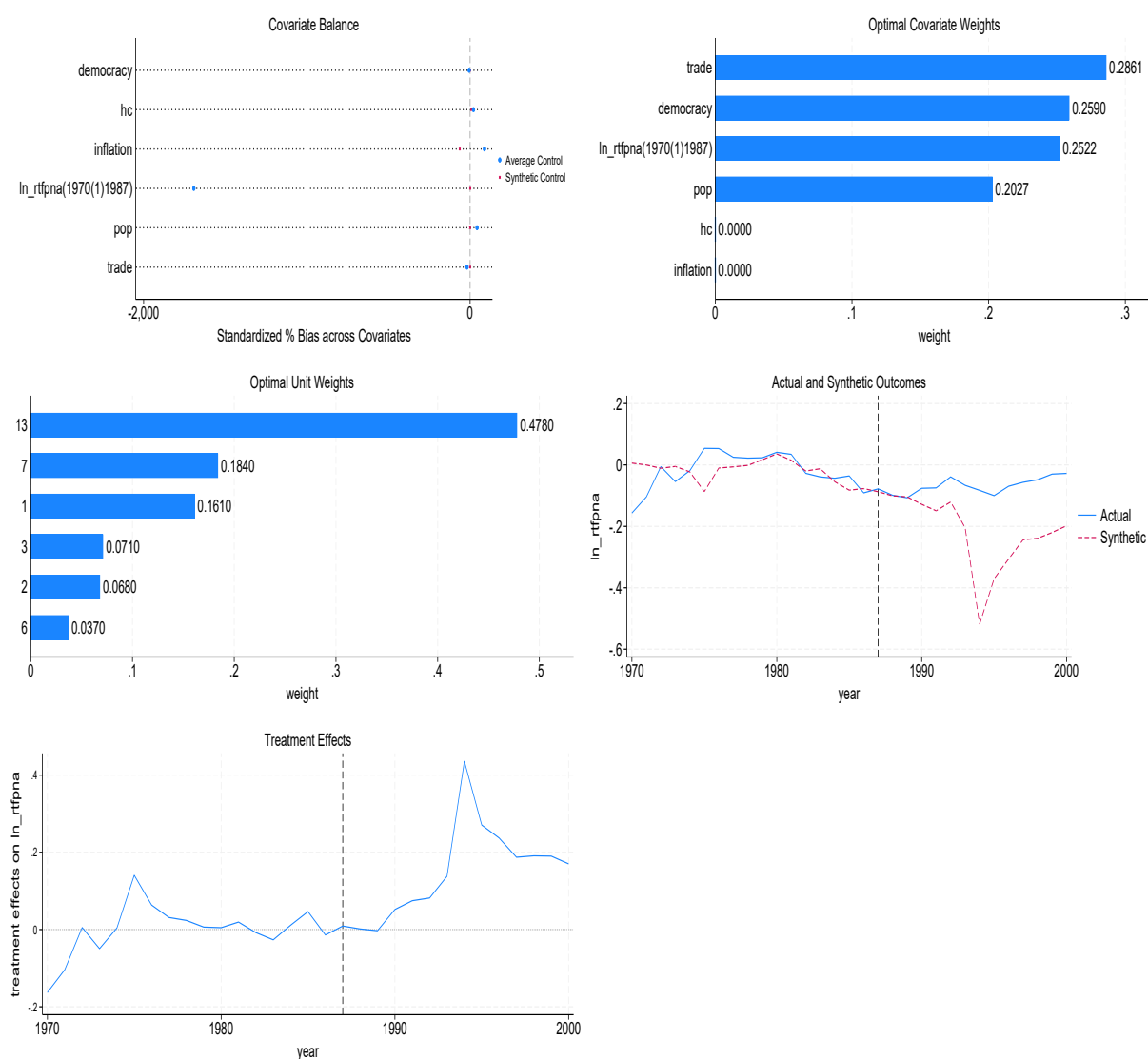


Figure 3.9: The gap in Total Factor Productivity between actual and synthetic Tunisia

Table 3.11: Prediction Results in the Post-Treatment Periods (TFP)

Year	Actual Outcome	Synthetic Outcome	Treatment Effect
1988	-0.099	-0.101	0.002
1989	-0.107	-0.104	-0.003
1990	-0.076	-0.128	0.052
1991	-0.075	-0.149	0.075
1992	-0.039	-0.121	0.082
1993	-0.066	-0.204	0.138
1994	-0.083	-0.519	0.436
1995	-0.100	-0.371	0.271
1996	-0.069	-0.306	0.237
1997	-0.056	-0.244	0.187
1998	-0.048	-0.239	0.191
1999	-0.030	-0.220	0.190
2000	-0.028	-0.198	0.170
Mean	-0.067	-0.223	0.156

Comparison of the effects on both transmission channels

Table 3.12 summarizes the estimated magnitudes of each transmission channel through which the post 1988 VAT reform affected Tunisia's economic efficiency. The results indicate that both capital deepening and total factor productivity (TFP) contributed positively, though with different magnitudes. The capital stock channel accounts for roughly two thirds (about 38%) of the overall efficiency gains, suggesting that increased investment intensity and better capital utilization were central drivers of post reform performance. The TFP channel, contributing around 17%, reflects improvements in allocative efficiency and institutional quality that reinforced physical accumulation. Combined, these indirect effects nearly reproduce the total synthetic-control estimate of 0.17 log points $\approx 18.7\%$, confirming that Tunisia's post reform productivity gains resulted from the joint action of capital accumulation and efficiency improvements rather than a single dominant source.

Table 3.12: Transmission channels: magnitudes and significance

Channel (Outcome)	Avg. ATT (log)	Avg. ATT (%)
Direct: Output per worker ($\ln Y/L$)	0.121	12.8
Indirect: Capital per worker ($\ln K/L$)	0.325	38.4
Indirect: TFP ($\ln A$)	0.156	16.9

Notes: Percent effects are $100 \times (\exp(\text{ATT}) - 1)$.

The capital stock effect reflects how the VAT reform likely stimulated investment and capital accumulation. Tunisia's reform broadened the tax base and improved fiscal stability, which may have enhanced investor confidence, encouraged private investment, and financed infrastructure expansion. This led to strong capital deepening. Firms could increase machinery, equipment, and productive assets, explaining the large rise in capital per worker.

The stronger impact of VAT on capital per worker, compared to total factor productivity (TFP) in Tunisia, can be explained by the nature of the reform, the structural context of the economy, and the underlying transmission mechanisms. Introduced in 1988, Tunisia's VAT had an immediate quantitative effect: by replacing cumulative production and consumption taxes and allowing for input tax credits on investment goods, it effectively reduced the real cost of capital, improved the profitability of productive projects, and strengthened investor confidence. This fiscal neutrality toward investment, emphasized

in the neoclassical growth framework, led to a rapid accumulation of capital stock, as firms expanded machinery, equipment, and other productive assets.

In contrast, total factor productivity gains require deeper institutional and organizational transformations, such as technological diffusion, skill upgrading of the labor force, and more efficient resource allocation (Mondiale 2014). These adjustments tend to evolve slowly in an economy where informality remains high and fiscal institutions are still fragile. Moreover, administrative inefficiencies such as delays in VAT refund processing (Guo and Li 2023), sectoral exemptions, and complex compliance procedures have limited the potential efficiency and innovation effects that VAT can theoretically generate. Consequently, the reform primarily acted as a driver of investment and physical capital accumulation rather than a catalyst for productivity enhancement. This pattern is consistent with evidence from other developing economies (Ebrill, M. M. Keen, and M. V. P. Perry 2001; M. Keen and Lockwood 2010; Adhikari 2020) where VAT reforms, in the absence of strong institutional capacity, tend to produce short-term effects on capital formation but only modest and delayed gains in total factor productivity.

3.6 Robustness

To assess the statistical significance of our findings, we examine whether the estimated effects could plausibly be attributed to random variation rather than a true causal impact. More precisely, we examine how frequently an effect of similar magnitude would arise if the treatment year were randomly assigned, replacing the actual intervention year (1988) with a placebo treatment date. To address this, we conduct in-time placebo tests following the approach of Abadie, A. Diamond, and Hainmueller (2015). We select two placebo intervention dates, 1980, 1983, 1985 and re-estimate the model under the assumption that the treatment occurred in those years. If the estimated placebo effects during the periods 1980-1988, 1983-1988 or 1985-1988 were found to be large or statistically significant, this would cast doubt on the robustness of our main results. However, the results shown in Figures 3.10, 3.11 and 3.17 indicate that the gaps between the actual and synthetic outcomes during those placebo periods are neither large nor statistically significant. These findings suggest that the observed treatment effect is unlikely to be the result of spurious trends, thereby strengthening the credibility of our main results.

According to Abadie (2021), in the context of synthetic control methods, two key elements that may influence the results are the selection of donor pool units and the set of predictors used to construct the synthetic control. To assess the sensitivity of our results to donor pool composition, we implement a leave-one-out (LOO) robustness test. In this approach, we iteratively re-estimate the model by excluding, in each iteration, one donor country that received a positive weight in the original synthetic control.

Figures 3.12, 3.18 and 3.19 display the results of this test. The solid blue line and dashed red line represent the trajectories of Tunisia and its synthetic counterpart, respectively, while the grey lines indicate the LOO estimates. The fact that most grey lines lie below the black line and follow a trajectory close to the dashed red line suggests that our treatment effect estimates are robust to the exclusion of individual donor units. The leave-one-out robustness tests confirm the stability of the estimates: the successive exclusion of each donor country does not significantly alter the synthetic trajectory or the sign of the estimated effect. Following the introduction of VAT in 1988, the estimated effects remain positive for total factor productivity, capital per worker, and output per worker, indicating a sustained improvement in economic performance. These results are, therefore, consistent, economically plausible,

and resistant to dependence on any single donor, reinforcing the validity of the estimated impact of VAT on productivity in Tunisia.

In addition, we assess the robustness of our findings using an alternative measure of economic efficiency: expenditure-side GDP from PWT 10.01 (see Figure 3.13). For the estimation of economic efficiency and factor-productivity, we exclude the year of the direct tax reform (1987), and the years of Rwanda's war (1990–1994). The results of these robustness check tests are presented in Figures 3.14 and 3.16. We assess the robustness of our findings by excluding specific control variables that may be problematic. This involves re-estimating the model while sequentially omitting each variable. In particular, we exclude inflation, as it may capture broader macroeconomic fluctuations unrelated to the treatment (see Figure 3.15). The results remain statistically significant, confirming the robustness of our findings.

Across all alternative specifications, the main results remain consistent and statistically significant, indicating that the estimated effects are not sensitive to the exclusion of few years. It is worth noting that the observed convergence of the actual and synthetic trajectories during certain periods may be influenced by other policy changes in the treated country or in donor countries. Such coinciding reforms may partially reduce the gap between the actual and synthetic outcomes, potentially diluting the measured treatment effect. Nonetheless, the overall pattern of results reinforces the credibility and robustness of our identification strategy.

3.7 Generalizability of Tunisia's VAT Experience

Beyond the Tunisian case, the general relevance of these results depends strongly on each country's institutional and structural conditions. The VAT literature emphasizes that the effectiveness of such a reform depends on administrative capacity, tax system design, and the level of informality (Ebrill, M. M. Keen, and M. V. P. Perry 2001; M. Keen 2008; International Monetary Fund 2010)

In Tunisia, a number of factors contributed to the effectiveness of the 1988 reform. The VAT replaced turnover and consumption taxes, eliminating cascading effects and improving the neutrality of the tax system. This transition promoted a more efficient allocation of resources and an increase in the

capital to labor ratio. At the same time, the reform was accompanied by administrative modernization, including the introduction of taxpayer identification numbers, the centralization of registrations, more systematic enterprise audits, and the adoption of the Tax Rights and Procedures Code (Alm 2016). However, several structural constraints limited the scope of these effects. Starting in 1988, numerous exemptions were introduced and later expanded in the 1990s under the Investment Incentives Code (loi n°93-120). Several weaknesses have likely limited the long-term efficiency gains: the growing weight of special regimes (exemptions and suspensions), delays in VAT refund payments and heavy administrative procedures, multiple tax rates and Tunisia's persistently large informal sector. These constraints help explain why the initial positive impact of the VAT diminished over time.

To replicate Tunisia's initial success, a country must meet several conditions: an efficient and digitized tax administration, a broad tax base with few exemptions, a simple and stable rate structure and a moderate level of informality and strong institutions. Conversely, countries characterized by weak administration, numerous exemptions, or high informality will likely see efficiency gains fade over time (R. Bird and Gendron 2007). New Zealand provides a benchmark example of success: its Goods and Services Tax, introduced in 1986, is based on an extremely broad base with almost no exemptions, a single rate (10% initially, later raised to 15%). The result is a neutral and efficient tax with low evasion and high compliance (Due 1988; Maples and Sawyer 2017).

In summary, Tunisia succeeded in implementing an initially effective VAT. However, the expansion of the informal sector, the broadening of tax incentives in 1993, and the proliferation of special regimes gradually weakened their impact on productivity. The experience shows that a simple, well-administered VAT with few exemptions, operating in a strong institutional environment with limited informality, remains key to achieving durable and equitable fiscal efficiency.

3.8 Conclusion

This chapter analyzes the impact of VAT adoption on economic efficiency using the SCM developed by (Abadie and Gardeazabal 2003; Abadie, A. Diamond, and Hainmueller 2010; Abadie, A. Diamond, and Hainmueller 2015). This method estimates the causal effect of VAT implementation by comparing the post-treatment trajectory of Tunisia's output per worker with a counterfactual scenario constructed from a weighted combination of similar countries that did not adopt VAT during the same period. The main finding is that the adoption of VAT in Tunisia had a statistically significant and economically meaningful short-term impact, which gradually diminished over time, increasing output per worker by approximately 12.8 percent over a 12-year period. Robustness checks, including in-time placebo tests, leave-one-out procedures, and sensitivity analysis support the validity of the results. Importantly, our findings are consistent with those of Adhikari (2020) and Ufier (2014), who show that VAT adoption has positive effects in upper-middle-income countries. Tunisia falls within this category, which helps explain the observed economic benefits.

Our results can be explained by the fact that, in economic terms, replacing turnover-based taxes with a VAT significantly improved the efficiency of Tunisia's tax system. Turnover and retail sales taxes distorted economic activity by taxing intermediate inputs at multiple stages of production, thereby increasing costs for both businesses and consumers. The introduction of VAT eliminated these cascading effects by allowing firms to deduct input taxes and by shifting the tax burden to final consumption. However, in Tunisia, exemptions particularly in agriculture and services have reintroduced distortions, since exempt firms cannot claim input tax credits and therefore remain subject to cascading taxation. Widespread informality and tax evasion (Schneider 2005; Alm and Embaye 2013) further undermine neutrality, as many firms avoid registration to minimize compliance costs. The administrative complexity and compliance burden of VAT, often perceived as higher than that of turnover or sales taxes, have discouraged participation among small and medium enterprises (Hines Jr 2004; Coolidge 2012). Over time, these institutional weaknesses and behavioral responses have eroded the initial efficiency gains, as enforcement weakened, exemptions multiplied, and tolerance toward evasion increased. Consequently, VAT in Tunisia may now operate less as a pure consumption tax and more as a partially production-

distorting levy, underscoring the importance of sustained administrative modernization and policy discipline to preserve long-term efficiency.¹⁴

Even if not analyzed in this study, the imperfections noted above together with policy changes such as VAT exemptions linked to tax incentives in 1993, the introduction of a new 10% intermediate rate in 1995, and the increase of the standard rate from 17% to 18% in 1998 likely increased system complexity. Consistent with International Monetary Fund (2010) advice, efficiency would be better served by consolidating rates, broadening the base through fewer exemptions, simplifying regimes, and sequencing reforms with stronger administrative capacity and careful political calibration (International Monetary Fund 2010). However, this study also has some limitations. It focuses on a single treated country, which limits the generalizability of its conclusions. The analysis also does not account for variation in VAT design, such as rate levels, the number of tax brackets, registration thresholds, or the speed of input tax rebate payments, all of which could significantly influence VAT's effectiveness (Edmiston and Fox 2006). These limitations point to the need for future studies that explore the finer aspects of VAT implementation and its heterogeneous impacts across diverse national contexts. Based on this study, we recommend that the government consolidate rates, broaden the base by cutting exemptions, simplify regimes, modernize administration, streamline refunds, implement e-invoicing, apply risk-based audits, and lower SME compliance costs to preserve VAT neutrality and efficiency. Implementation capacity matters as much as law: a well-designed, well-enforced VAT delivers sizable efficiency gains, while legislation without strong administration underperforms. In operational terms, short-term priorities should focus on rate consolidation, simplification of VAT regimes, broadening the base through the reduction of exemptions, and administrative modernization through digital filing, e-invoicing pilots, faster refund processing, and data driven audit selection. These measures are realistically actionable within the current institutional framework and can yield immediate efficiency improvements. Medium and long term reforms, by contrast, require institutional strengthening including capacity building within the tax administration, full automation of refund and audit systems, integration of the informal sector into the VAT base, and enhanced inter agency coordination. These structural reforms demand sustained

¹⁴See Gilchrist et al. (2023), "Synthetic Control Method: A Tool for Comparative Case Studies in Economics", *Journal of Economic Surveys*, which, similarly to our study, explains the observed decline following the oil discovery by referring to an event related to the main event of interest, namely the nationalization of the oil sector in 1976.

political commitment and investment, but they are essential to securing the neutrality, durability, and credibility of Tunisia's VAT system over time.

3.9 Annex 3.

Table 3.13: Comparative Averages: Labour Productivity and Shadow Economy

Country	Region	Income Group	Labour Productivity	Shadow Economy
Angola	SSA	LMC	5,822	44.5
Bahrain	MENA	HIC	62,858	17.3
Botswana	SSA	UMC	15,079	29.8
China, Hong Kong SAR	EAP	HIC	55,572	15.0
Costa Rica	LAC	UMC	25,839	23.5
D.R. of the Congo	SSA	LIC	5,048	49.7
Egypt	MENA	LMC	10,658	33.8
Jordan	MENA	UMC	18,503	17.3
Liberia	SSA	LIC	3,626	41.8
Malaysia	EAP	UMC	22,948	31.0
Myanmar	EAP	LIC	2,283	47.0
Rwanda	SSA	LIC	2,536	34.8
Saudi Arabia	MENA	HIC	94,498	16.3
Oman	MENA	HIC	46,000	17.7
Tunisia	MENA	LMC	20,746	34.7
Average (excl. Tunisia)			29,983	29.9

Notes: Labour productivity calculated as RGDP/EMP from Penn World Tables 10.0 (1970-2000). Shadow economy data from Medina and Schneider (2019). Region and income group classifications of the World Bank(2000).

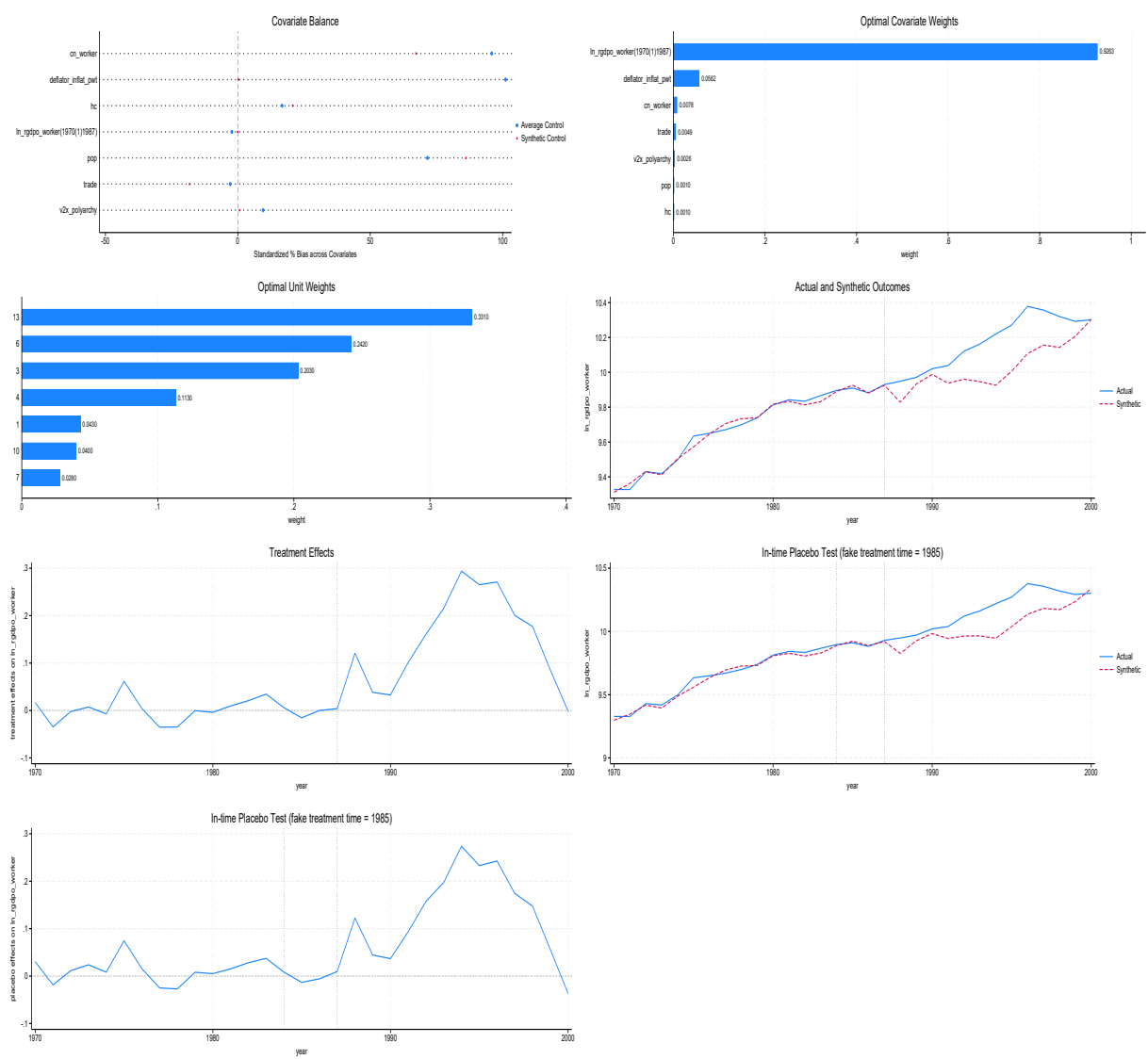


Figure 3.10: In-time placebo test: fake treatment year = 1985

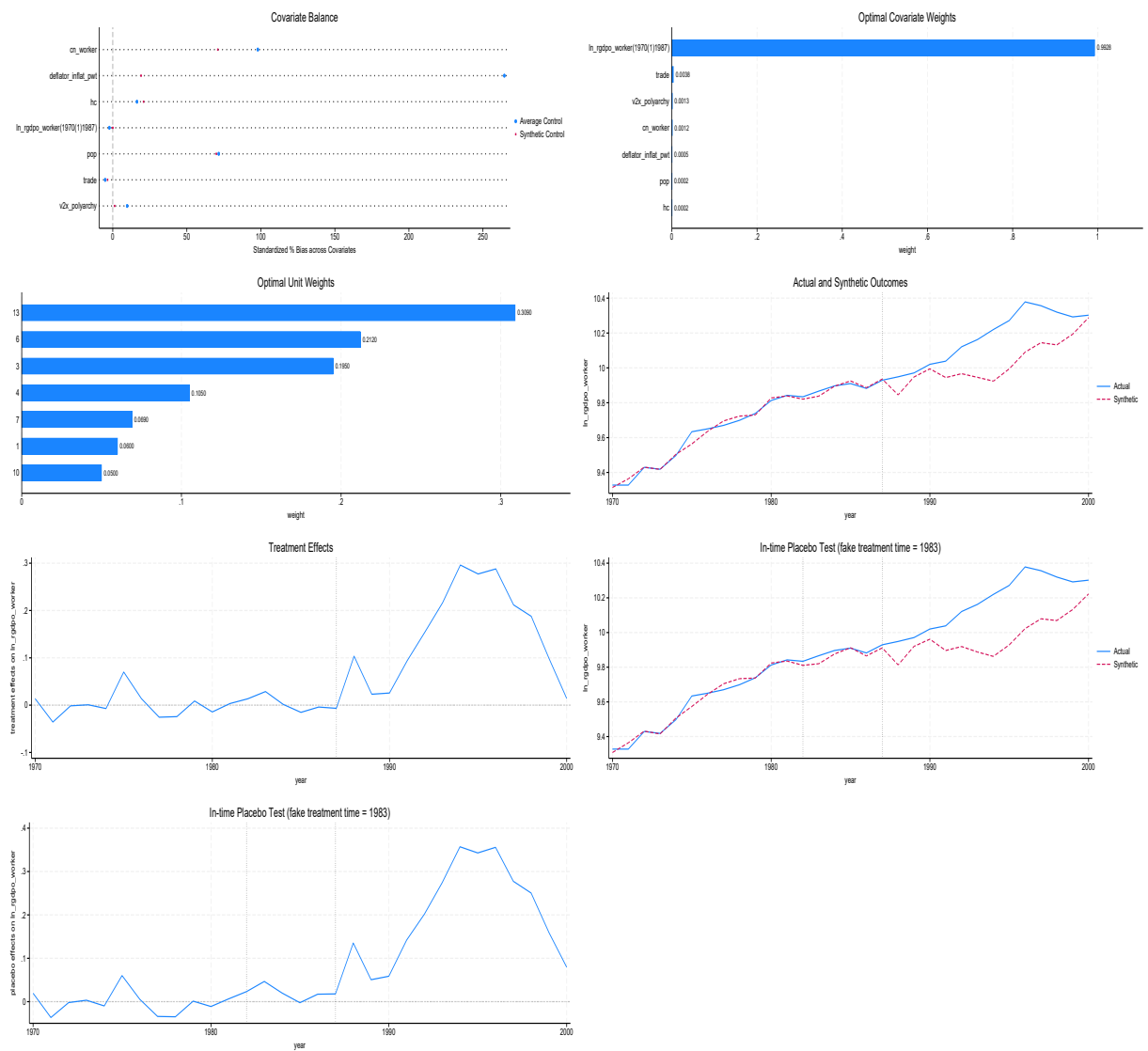


Figure 3.11: In-time placebo test: fake treatment year = 1983

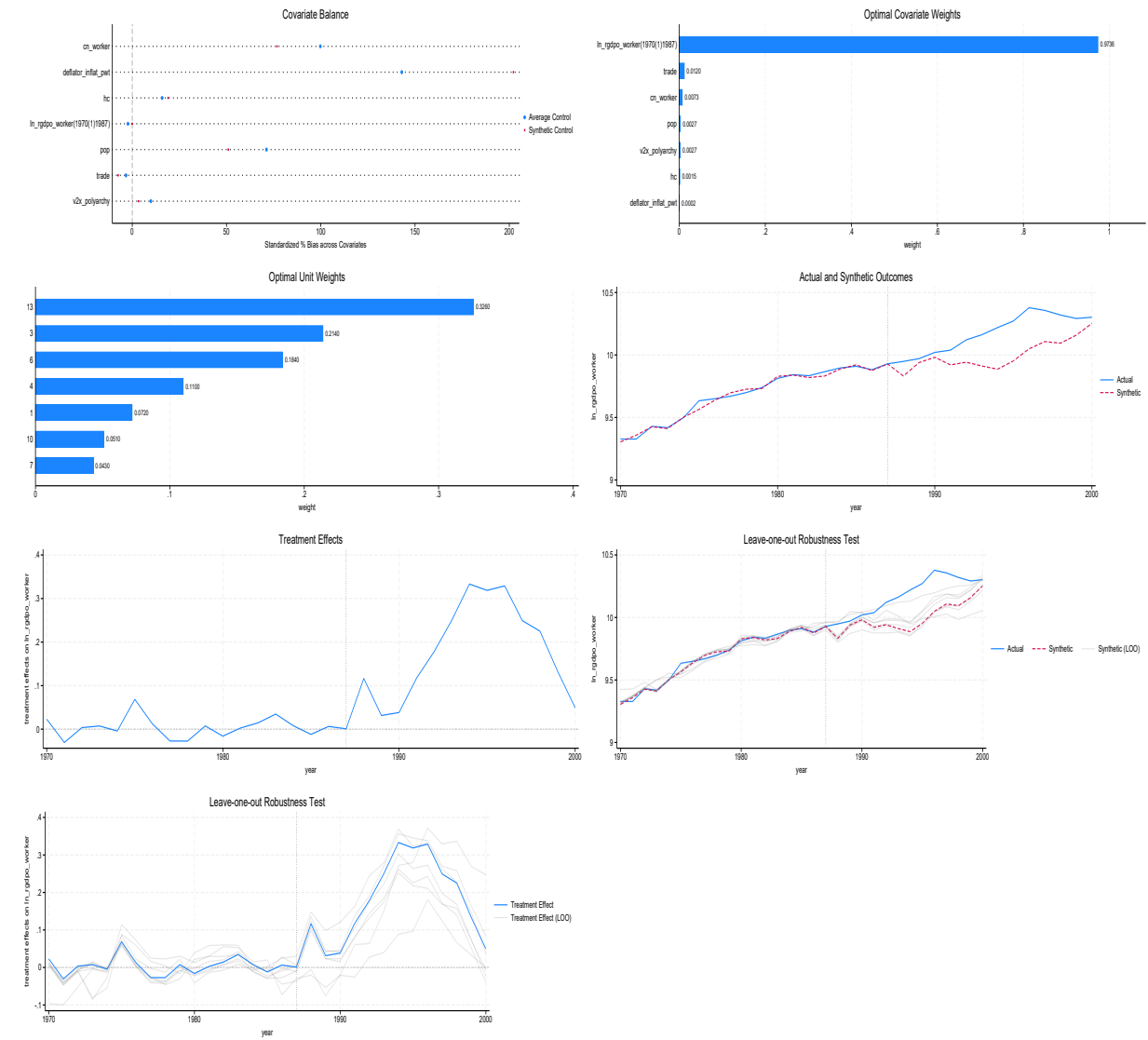


Figure 3.12: Leave one out test: Output per worker

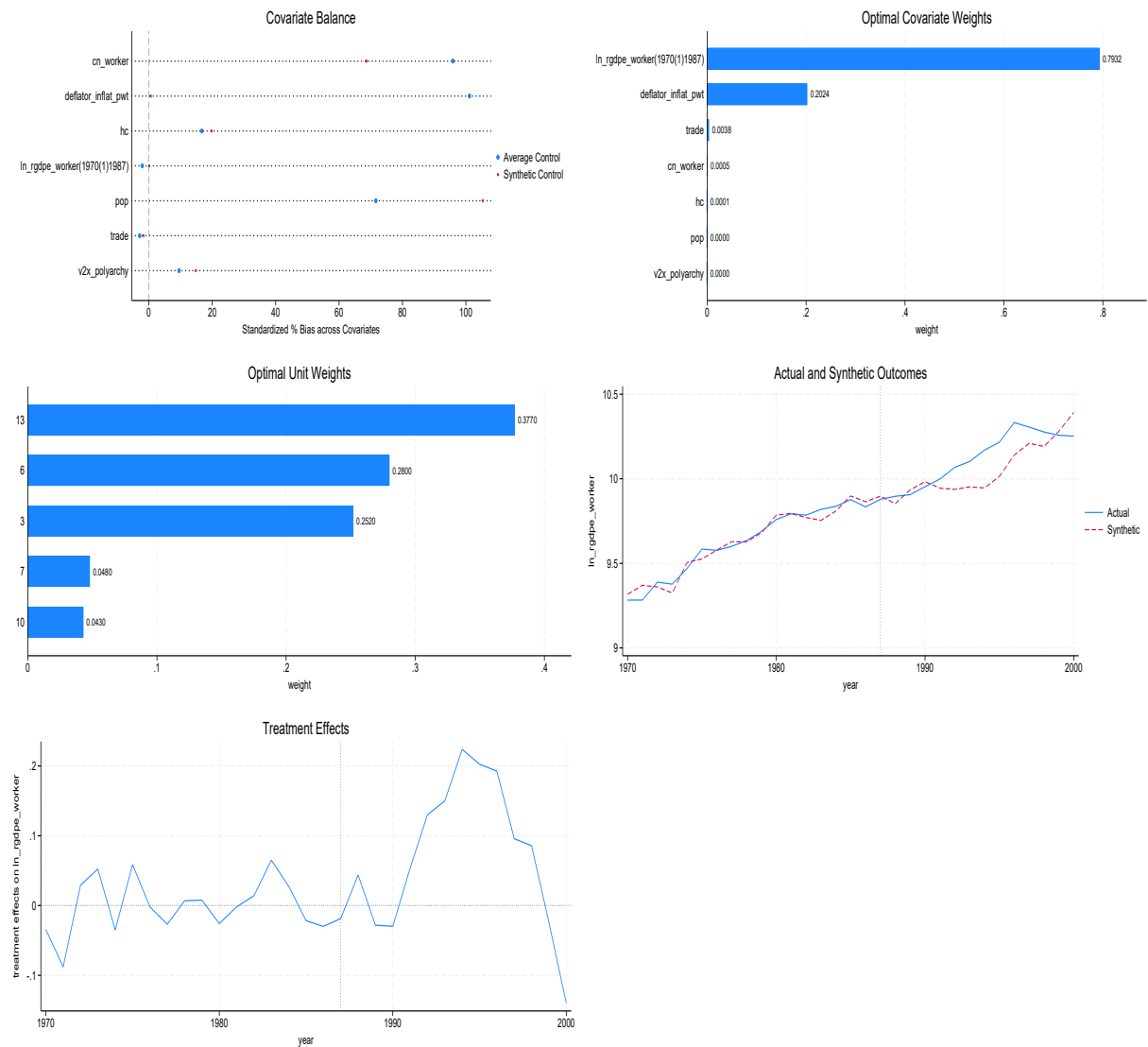


Figure 3.13: Alternative economic efficiency: Expenditure-side

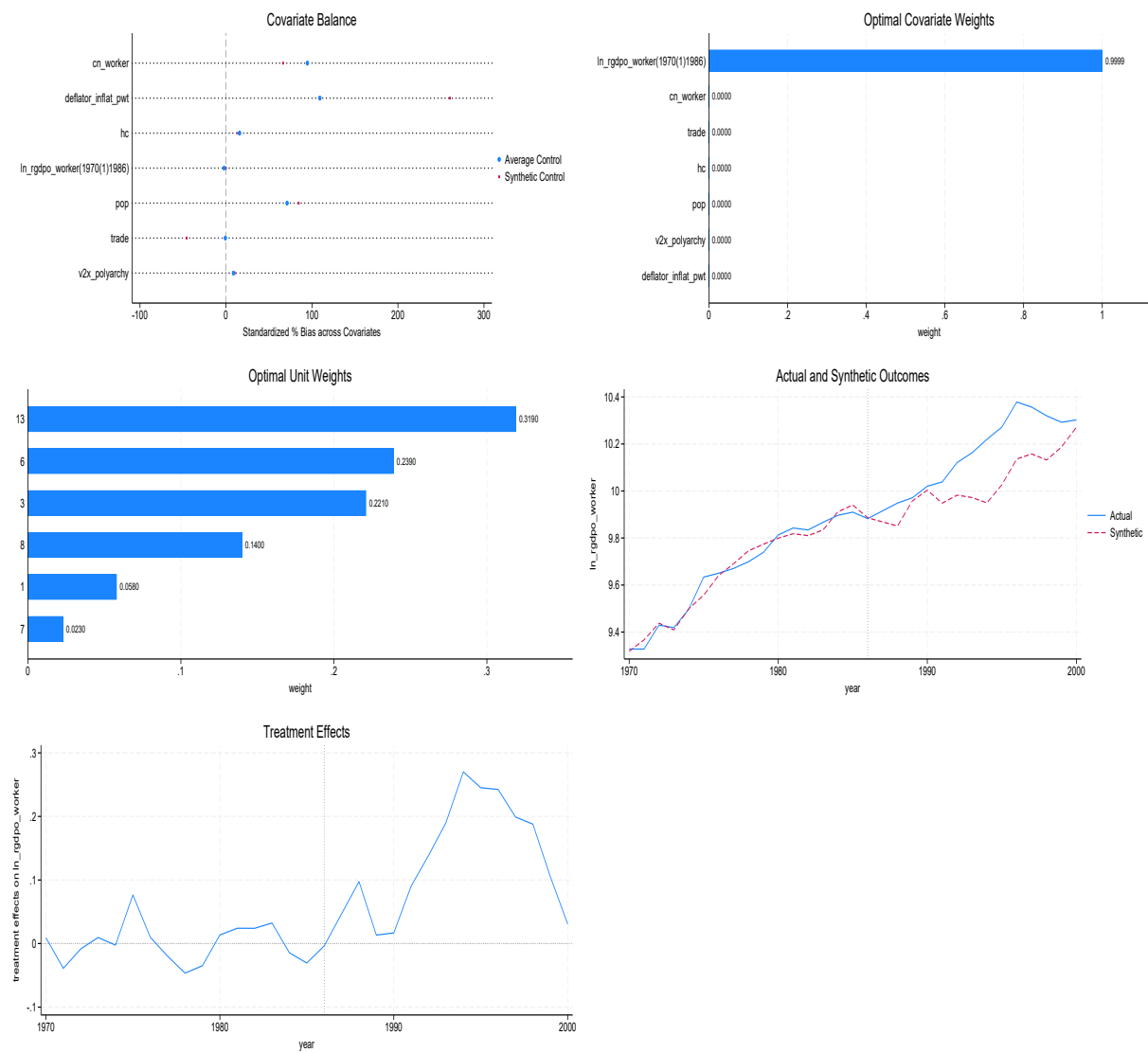


Figure 3.14: Robustness check by dropping the year of Direct taxes reform :1987

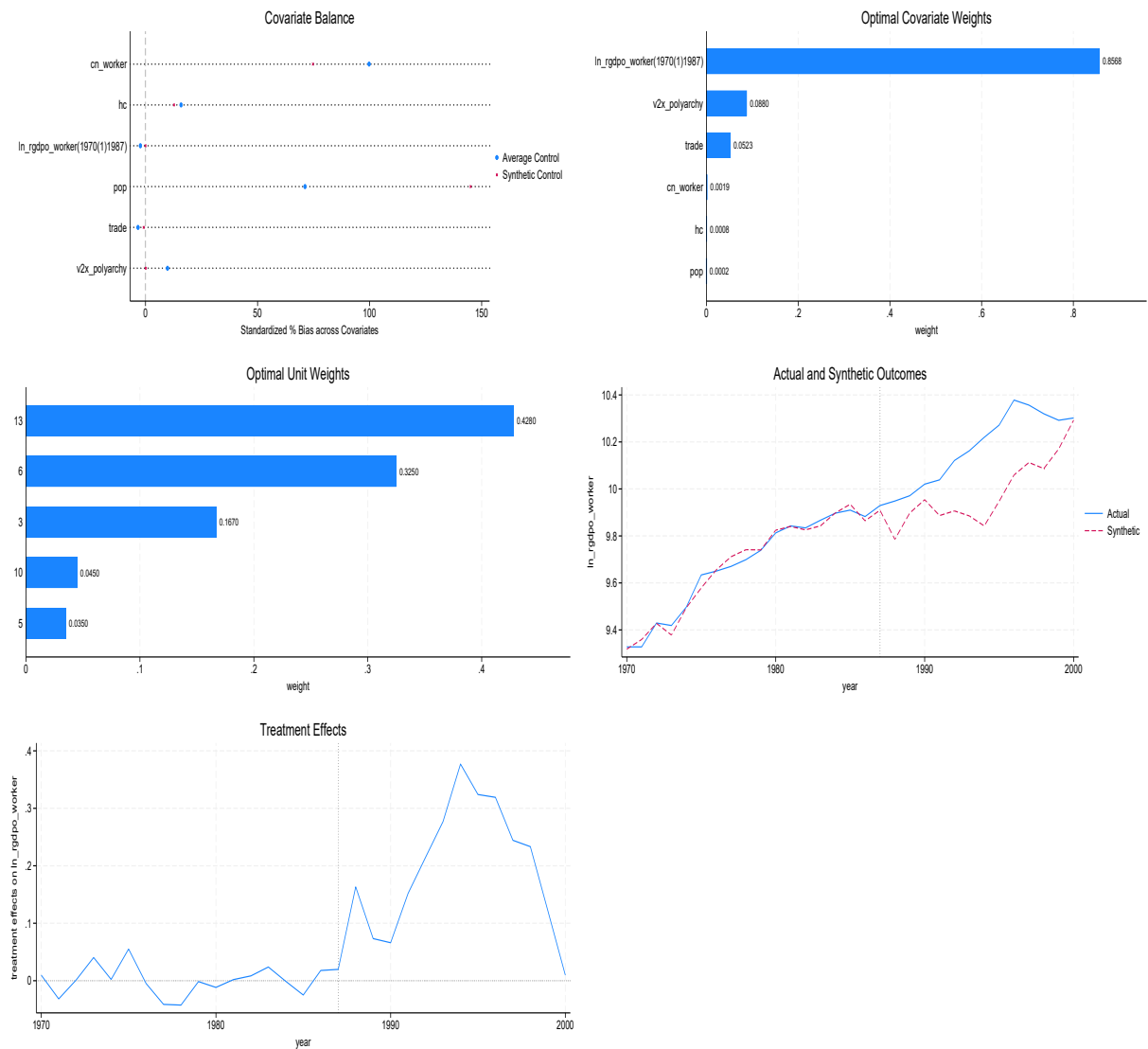


Figure 3.15: Robustness check by dropping Inflation

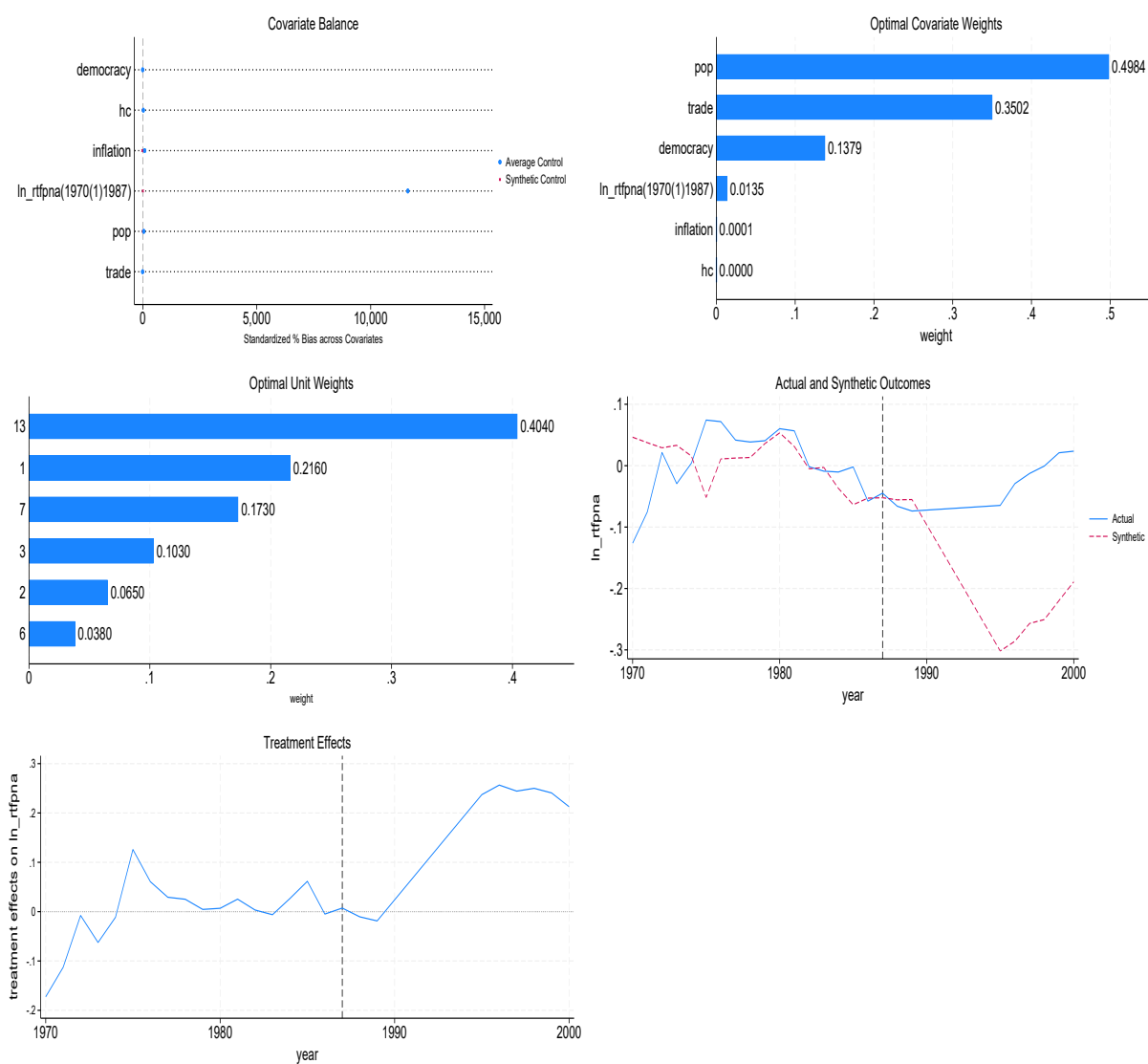


Figure 3.16: The TFP gap between actual and synthetic Tunisia, excluding the 1990–1994 war period in Rwanda

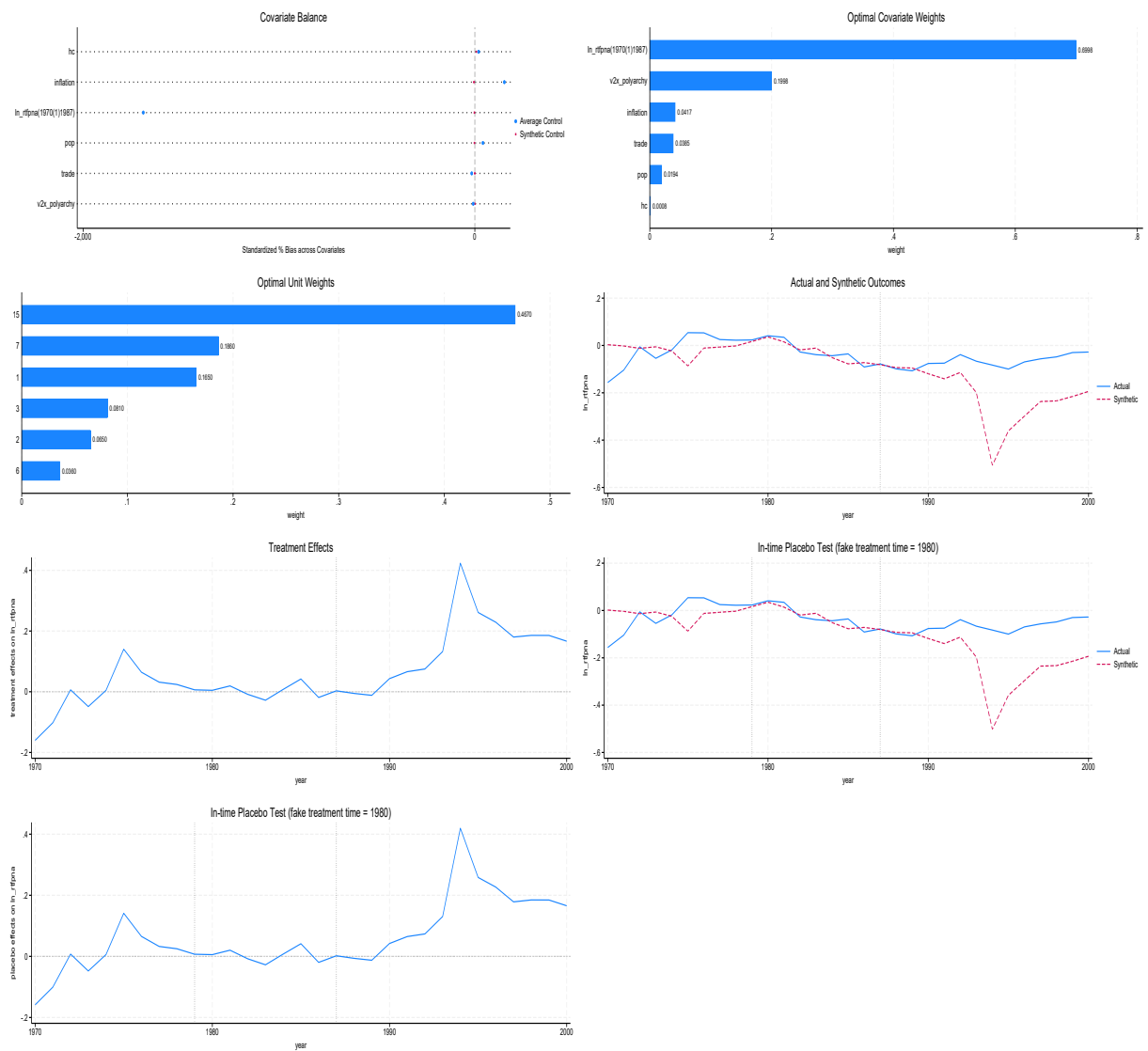


Figure 3.17: 3: Graphs for the in-time placebo test with fake treatment time :\"1980\": TFP

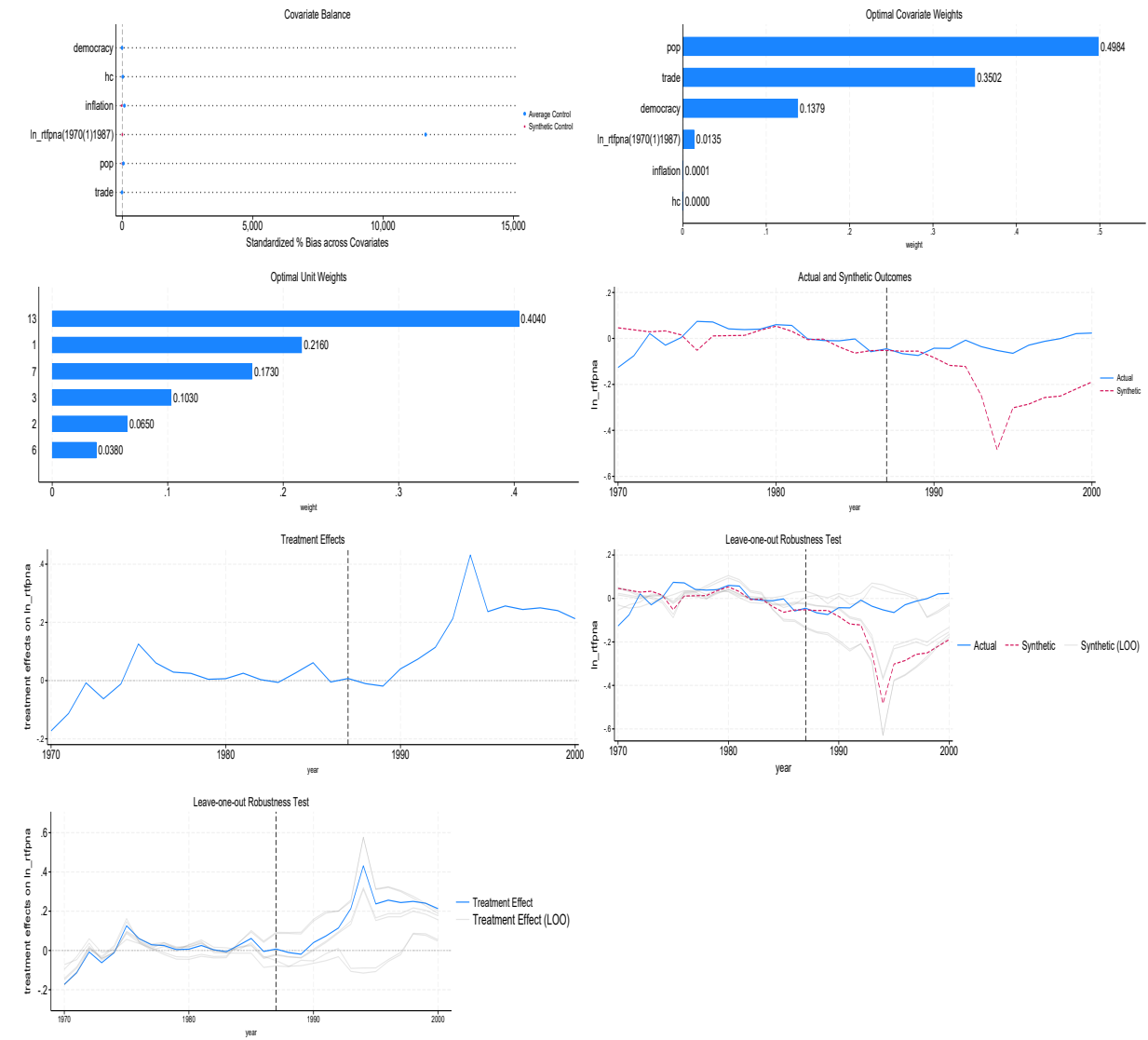


Figure 3.18: Leave one out test: TFP

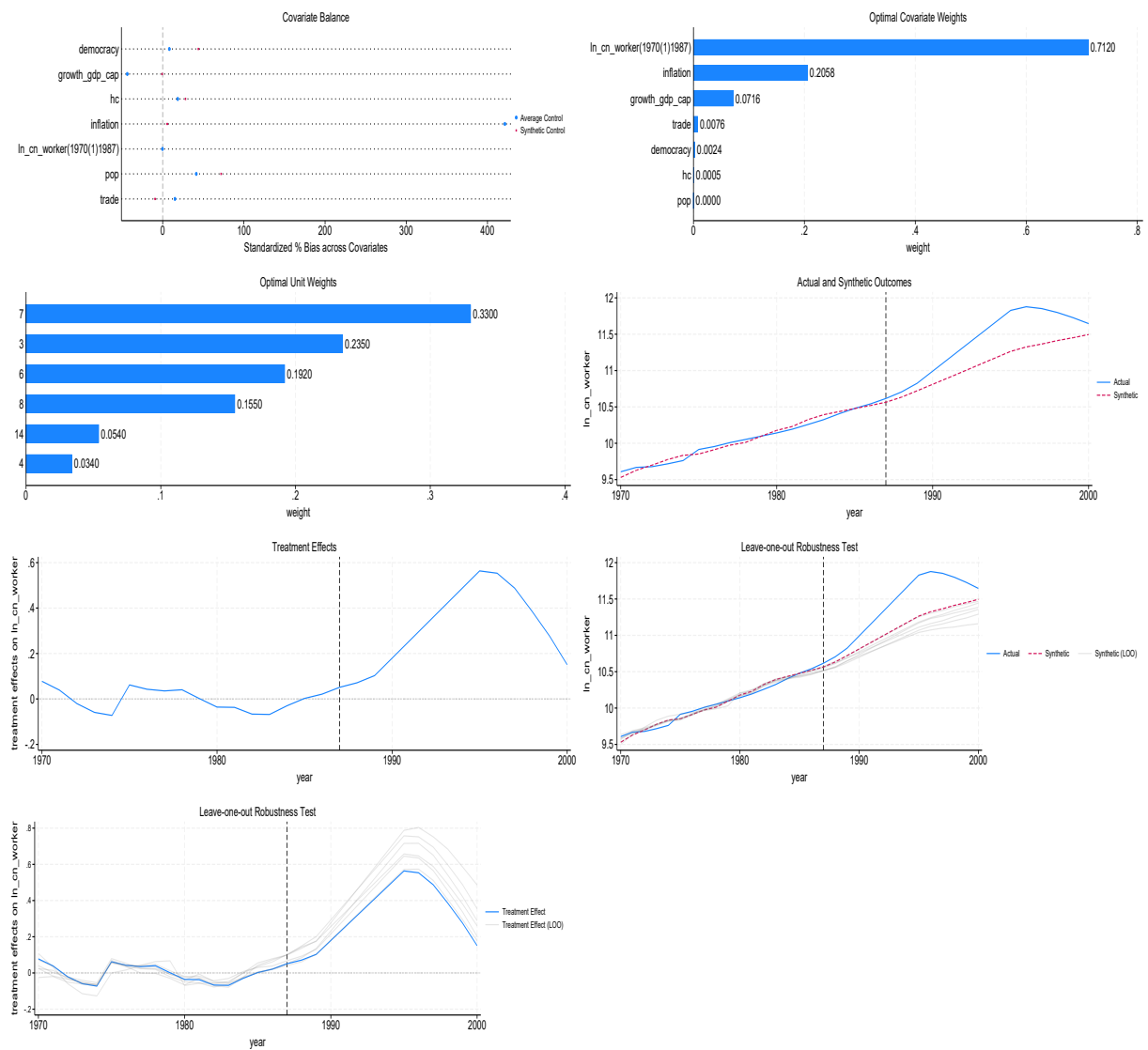


Figure 3.19: Leave one out test: Capital stock

Conclusion générale

Depuis plusieurs décennies, les organisations internationales intensifient leurs efforts de lutte contre la corruption et l'évasion fiscale, tout en plaidant pour des réformes institutionnelles et fiscales à l'échelle mondiale. Ces réformes visent à renforcer la transparence, l'équité et l'efficacité des systèmes de gouvernance et de taxation, considérés comme des leviers déterminants du développement économique. Depuis les années 1990, l'essor des données relatives à la qualité institutionnelle a nourri une littérature abondante montrant que des institutions solides conditionnent la performance macroéconomique et la capacité des États à mobiliser des ressources publiques. Dans ce cadre, la réforme fiscale s'impose à la fois comme un instrument de modernisation et comme une réponse aux pratiques d'optimisation agressive et d'évasion fiscale qui érodent l'assiette et fragilisent la soutenabilité budgétaire. L'évasion fiscale, fréquemment favorisée par des dispositifs réglementaires complexes, des failles de gouvernance et des mécanismes de contrôle insuffisants, met en lumière les limites d'un cadre fiscal inéquitable. L'amélioration de la qualité institutionnelle et l'adaptation du système fiscal apparaissent ainsi comme deux dimensions complémentaires et indissociables de la stratégie de préservation des recettes publiques.

L'objectif de cette thèse s'inscrit dans cette dynamique. Il consiste à analyser la relation entre la corruption, manifestation centrale d'une défaillance institutionnelle, les facteurs institutionnels et la mobilisation des recettes fiscales. Plus précisément, il s'agit d'examiner comment les différentes formes de corruption affectent la capacité de l'État à lever l'impôt et dans quelle mesure les facteurs institutionnels et les réformes fiscales adéquates peuvent atténuer ces effets, notamment en réduisant les comportements d'évasion et en rétablissant la confiance des contribuables. Cette approche permet

d'éclairer les conditions sous lesquelles l'amélioration de la qualité institutionnelle se traduit en gains tangibles de mobilisation des ressources domestiques.

Les résultats de notre étude peuvent être résumés comme suit. Après avoir passé en revue de littérature sur le sujet, le **Chapitre 1** affirme l'existence d'une relation non-linéaire entre la corruption et les recettes fiscales déterminée à la fois par son intensité et par sa forme dans les pays en développement. Ainsi, la corruption exerce deux effets antagonistes sur les recettes fiscales. Elle stimule les recettes fiscales publique. Elle stimule les recettes fiscales à de faibles niveaux, en réduisant les lenteurs administratives et en facilitant certaines procédures bureaucratiques (effet d'huile dans les rouages). En revanche, lorsque son intensité s'accroît ou qu'elle touche des sphères institutionnelles clés, elle favorise l'évasion et la fraude fiscales, alimente la recherche de rentes et mine la confiance des contribuables, ce qui freine la mobilisation des recettes (effet de sable dans les rouages). En mobilisant un cadre GMM et des indicateurs V-Dem désagrégés, nous montrons une relation en « cloche » entre corruption et recettes fiscales : la corruption administrative, exécutive et de régime peut être légèrement favorable à faible intensité, puis devient défavorable au-delà d'un seuil, tandis que la corruption judiciaire et législative est négative d'emblée. Cette dynamique s'explique par deux canaux opposés : réduction ponctuelle des frictions administratives versus baisse de la conformité, érosion de la confiance et contraction de l'assiette.

Le **Chapitre 2** met en évidence le rôle central de la qualité institutionnelle dans la mobilisation des recettes fiscales. À l'aide d'un modèle d'équations structurelles et de différentes approches économétriques, les résultats confirment qu'un renforcement de la qualité des institutions favorise une meilleure performance fiscale. Ce lien s'explique notamment par la capacité des institutions solides à attirer et à canaliser efficacement les investissements directs étrangers, tout en garantissant un environnement politique, économique et culturel plus stable. L'analyse montre que l'effet direct des institutions sur les recettes fiscales est significatif, tandis que leur effet indirect, via l'IDE, reste plus limité et varie selon le niveau de revenu des pays. En particulier, la médiation de l'IDE est la plus marquée dans les pays à revenu intermédiaire, où la phase d'industrialisation rapide stimule la production, la consommation et, par conséquent, les recettes fiscales. Dans ces économies, la capacité d'absorption des entreprises favorise également les retombées positives des IDE sur le tissu productif local. En revanche, dans les

pays à faible revenu, cet effet reste faible, voire inexistant, en raison de la faiblesse institutionnelle, de la dépendance aux incitations fiscales et de la vulnérabilité face à l'évasion des multinationales, ce qui fragilise l'assiette fiscale et limite les retombées budgétaires. Ces résultats soulignent que la bonne gouvernance et la qualité institutionnelle sont des leviers essentiels pour accroître les recettes fiscales, notamment dans les pays à revenu intermédiaire et élevé. Toutefois, leur efficacité dépend de la cohérence des politiques fiscales, de la transparence des incitations accordées aux investisseurs et de la stabilité politique et économique. En ce sens, les pays à faible revenu doivent repenser leurs stratégies d'attraction des IDE en privilégiant la qualité plutôt que la quantité des investissements, et en réformant leurs systèmes fiscaux en particulier la TVA afin d'élargir la base imposable tout en préservant l'équité sociale.

Le **Chapitre 3** s'inscrit dans le cadre théorique du théorème d'efficience de la production de P. A. Diamond and Mirrlees (1971), selon lequel un système fiscal optimal ne doit pas distordre les décisions de production, même en présence d'autres distorsions. Autrement dit, l'impôt ne doit pas modifier les choix productifs des entreprises afin d'assurer une allocation efficiente des ressources. Sur le plan empirique, ce chapitre s'appuie sur la méthode du contrôle synthétique, un outil quasi-expérimental, afin de mesurer l'impact de l'instauration de la taxe sur la valeur ajoutée, qui a remplacé un ensemble de taxes sur le chiffre d'affaires, sur l'efficience économique en Tunisie. Grâce à cette approche, nous confirmons l'existence d'un effet positif de l'introduction de la TVA sur l'efficience économique, bien que cet effet demeure limité dans le temps : la courbe de performance tend à s'infléchir après une certaine période. Cette évolution s'explique notamment par la prévalence de l'évasion fiscale et l'importance du secteur informel, caractéristiques structurelles d'une économie en développement. Deux mécanismes principaux expliquent l'impact de la TVA sur l'efficience économique sont l'accumulation du capital et l'amélioration de la productivité totale des facteurs. Toutefois, dans un contexte institutionnel fragile marqué par une forte informalité et une faible discipline fiscale, les effets de la TVA sur ces canaux demeurent également restreints. Ces résultats suggèrent que les avantages théoriques de la TVA ne se traduisent pas automatiquement dans la pratique. L'efficacité de cette taxe dépend étroitement du contexte institutionnel, du degré de modernisation de l'administration fiscale et de la capacité de l'État à assurer la conformité des contribuables. La TVA ne saurait donc être considérée comme un "remède

universel" capable, à elle seule, de stimuler la croissance et de mobiliser les recettes publiques. Pour en tirer pleinement parti, il est essentiel d'accompagner sa mise en œuvre par un renforcement institutionnel, une simplification des procédures fiscales et une amélioration de la gouvernance administrative et du contrôle fiscal.

Cette thèse apporte plusieurs contributions originales et complémentaires à la littérature sur la mobilisation des recettes fiscales dans les pays en développement. Sur le plan empirique, elle s'appuie sur des bases de données récentes et multidimensionnelles (V-Dem, ICRG, UNU-WIDER, UNCTAD) afin de proposer une analyse désagrégée et dynamique des déterminants institutionnels de la fiscalité. Sur le plan méthodologique, elle innove par l'utilisation combinée d'approches économétriques avancées. Modèles des moments généralisés dynamique, modèles d'équations structurelles et méthode du contrôle synthétique qui permettent d'examiner simultanément les effets directs, indirects et structurels, tout en améliorant la robustesse des inférences causales. Le Chapitre 1 contribue à renouveler l'analyse du lien entre corruption et fiscalité en introduisant une approche désagrégée et non linéaire de la corruption, comblant ainsi une lacune de la littérature qui s'appuyait principalement sur des indicateurs agrégés. Le Chapitre 2 élargit le champ d'analyse en intégrant le rôle des investissements directs étrangers comme canal de transmission entre la qualité institutionnelle et la mobilisation des recettes fiscales, offrant une lecture plus fine des interactions entre gouvernance, attractivité économique et performance fiscale. Enfin, le Chapitre 3 innove en appliquant la méthode du contrôle synthétique à l'étude des réformes fiscales, en évaluant pour la première fois l'impact de l'introduction de la TVA en Tunisie sur l'efficacité économique, dans le prolongement des fondements du théorème de Diamond et Mirrlees.

Sur le plan des implications de politique économique, cette thèse souligne que la mobilisation durable des recettes fiscales repose avant tout sur le renforcement de la qualité institutionnelle. Des institutions stables, transparentes et efficaces améliorent la capacité de l'État à collecter l'impôt. Les résultats suggèrent également la nécessité d'une gestion plus rationnelle des incitations fiscales offertes aux investisseurs étrangers, en privilégiant celles qui soutiennent la diversification productive sans éroder la base imposable. Par ailleurs, le développement d'une administration fiscale moderne, fondée sur la numérisation, la simplification des procédures et la lutte contre l'informalité, constitue une priorité pour accroître l'efficacité du système fiscal.

Cette thèse ouvre plusieurs pistes de recherche. Un premier enjeu en lien direct avec le Chapitre 1 consiste à traiter plus finement les risques d'endogénéité et à tester le rôle modérateur de la qualité institutionnelle. Des travaux futurs devraient intégrer explicitement des indicateurs de gouvernance désagrégés afin d'examiner si et comment ils modulent l'effet de la corruption sur la mobilisation des recettes. Méthodologiquement, il conviendra aussi de s'appuyer sur les développements récents de l'économétrie non linéaire, notamment les modèles à seuils (panel threshold models), pour tester l'existence de relations non monotones entre défaillances institutionnelles et performance fiscale. Un second axe vise à élargir les canaux de transmission entre facteurs institutionnels et recettes au-delà des IDE. Dans la continuité du Chapitre 3, deux prolongements s'imposent. D'une part, comparer la Tunisie à d'autres pays MENA ayant introduit la TVA, au moyen d'une SCM comparative multi-pays, afin d'identifier les conditions sous lesquelles la TVA génère des gains d'efficience durables. D'autre part, analyser l'effet d'autres réformes fiscales que l'introduction de la TVA (réformes de barème et d'assiette de la TVA, réduction des exemptions, réforme de l'IS et de l'IR, modernisation de l'administration) pour mesurer leurs contributions respectives à la mobilisation des recettes. Ce passage évoque les améliorations méthodologiques que les recherches futures devraient adopter pour approfondir les résultats empiriques de ta thèse. L'idée centrale est de renforcer la robustesse des conclusions causales sur le lien entre les réformes fiscales, la qualité institutionnelle et la mobilisation des recettes publiques. Ce travail invite, enfin, à replacer la fiscalité au cœur du contrat social, en la concevant non seulement comme un moyen de financement de l'État, mais aussi comme un levier de légitimité, de cohésion et de développement économique dans les pays en développement.

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