Theoretical Economics Letters, 2024, 14, 1035-1045
https://www.scirp.org/journal/tel
ISSN Online: 2162-2086
ISSN Print: 2162-2078

Local Tax Determinants an Unbalanced Panel Data Analysis: Evidence in Moroccan Municipalities

Lina Benabdellah[1], Othmane Fahim[2]

[1]Department of Management, TELFER, University of Ottawa, Ottawa, Canada
[2]MASAFEQ Laboratory, National Institute of Statistics and Applied Economics, Rabat, Morocco
Email: lbena090@uottawa.ca, othmane.fahim@um5s.net.ma

How to cite this paper: Benabdellah, L., & Fahim, O. (2024). Local Tax Determinants an Unbalanced Panel Data Analysis: Evidence in Moroccan Municipalities. *Theoretical Economics Letters, 14,* 1035-1045.
https://doi.org/10.4236/tel.2024.143053

Received: February 24, 2024
Accepted: June 23, 2024
Published: June 26, 2024

Abstract

This research identifies the factors influencing local taxation across eight municipalities in Morocco using an unbalanced panel data set. This study is based on two econometric models: random and fixed effects models and examines the effects of various factors such as the professional tax (PT), the housing tax (HT), the tax on municipal services (MST), the population (Pop), the density (Density) and other tax and fees (OTFs) on the evolution of local tax. The findings underscore the importance of considering not only central government factors but also local dynamics to understand and predict the evolution of local tax revenue.

Keywords

Local Tax, Panel Data, Moroccan Municipalities, Taxation System

1. Introduction

While numerous studies in applied literature delve into the analysis of tax revenue at a national level (Hà, Minh, & Binh, 2022; Ayenew, 2016; Al-Qudah, 2021) and on a local level (Pollastri & Zanardi, 2015; Buettner, 1999; Delgado, Peñas, & Mayor, 2011).

This literature encompasses various aspects, spanning from the socio-economic and demographic traits of local areas—like age distribution, per-capita income, and unemployment rate—to the political attributes of local administrations, such as their political orientation, electoral dynamics, and fragmentation. Additionally, external factors like the vertical grants disbursed by the central government and the tax policies adopted by neighboring administrations play pivotal roles in influencing local tax determinations.

This paper delves into the factors influencing the evolution of tax revenues at a local level in Morocco, with a particular emphasis on the dynamics of local income tax (LT), including the professional tax, municipal service tax, habitation tax, other taxes and fees, population, and density. This study contrasts with previous analyses primarily conducted at a national or regional level, offering insights into the nuanced dynamics shaping tax revenues in local municipalities within Morocco.

This paper is structured as follows: Section 2 points out all the extensive economic literature on the determinants of tax revenue in different countries. Section 3 provides an overview of the local tax structure in Morocco. In Section 4, we present the data used, methodology, and econometric model specification. In Section 5, we discuss the empirical results. Section 6 concludes and offers possible extensions of this work.

2. Literature Review

Buettner (1999) presents a theoretical model where local jurisdictions determine tax rates and budget structures for public input and consumption goods, funded through a tax on capital income. The research explores how fiscal choices of one jurisdiction influence others, regardless of whether their focus is on raising local income or public consumption. These policy differences, combined with variations in size, contribute to differences in local tax rates. The theoretical implications regarding the distribution of tax rates are then examined using the case of local business taxation (Gewerbesteuer) in West Germany. Considering local interdependence in tax rate decisions, the study finds that tax rates are positively correlated with the population size of communities, even after controlling for density. Furthermore, the study identifies federally mandated local welfare expenses as a determinant of local tax differences, raising concerns about potential distortions induced by the German federal system.

Delgado, Peñas, and Mayor (2011) examine the determinants of local tax rates in Spain, focusing on the property tax and the motor vehicle tax across 2713 municipalities. The study explores the presence of tax mimicking, yardstick competition, and political trends through various spatial models. Political variables, including the ideology of incumbents and political fragmentation, are identified as significant determinants. The study suggests that incumbents with weaker political support exhibit stronger mimicking behavior, providing evidence in favor of yardstick competition. Additionally, the research indicates that incumbents tend to mimic neighboring municipalities governed by the same political party, confirming the existence of political trends in local tax rate decisions.

Maličká, Timková, and Vladimir Gazda (2012) analyze the determinants of local tax revenues within the European Union (EU). This research employs short-term and long-term panel data models to identify these determinants.

Beyond central government factors, the study reveals the significance of variables such as unemployment and decentralization rate in both short-term and long-term models. From a long-term perspective, population size and lagged local tax revenues also emerge as influential determinants. Maličká et al.'s research provides valuable insights into the factors influencing local tax revenues in the EU.

Pollastri and Zanardi (2015) investigate the determinants of tax set by local governments in the context of a significant reform in the Italian municipal property tax on real estate in 2012. The research utilizes a cross-sectional dataset encompassing all Italian municipalities and focuses on various factors influencing tax rate decisions. The findings highlight those institutional profiles resulting from the reform significantly impacted tax rate decisions made by municipalities. Alongside this, the study considers factors traditionally discussed in literature, including socio-demographic, economic, and political variables, as well as tax interactions. The research sheds light on the multifaceted influences on municipal tax-setting behavior during a period of substantial fiscal policy changes.

Ayenew (2016) explains the various efforts aimed at obtaining optimal fiscal policies with emphasis on the role of taxation as an instrument of economic development has been implemented in Ethiopia. Despite such efforts, the country's economy relies substantially on loans and grants (24% of GDP) to finance its investment requirement. This implies that the tax revenue of the country is at a low level. Therefore, this study aimed to empirically examine the major determinants of tax revenue in Ethiopia for the period ranging from 1975-2013, using Johansen maximum likelihood co-integration approach. The result revealed that in the long run real GDP per capita income, foreign aid and industrial value-added share of GDP positively and significantly affect tax revenue as percentage of GDP. However, inflation exerted a negative and significant influence. Whereas, in the short run only the level of real GDP per capita income, industrial value-added share of GDP and inflation rate are statistically significant in determining tax revenue percentage of GDP. Real GDP per capita income and inflation have negative effects, whereas industrial Value-added share of GDP has positive effects. Moreover, the coefficients of the lagged error correction term (ECM (−1)) are significant and negative as expected, which imply the existence of economic or government forces that restore the long run equilibrium from short run shocks.

Piancastelli and Thirlwall (2020) evaluate the tax effort of 59 developed and developing countries between 1996 and 2015. The study employs an international tax function, comparing actual tax-to-GDP ratios with predicted ratios based on factors like per capita income, trade share in GDP, productive structure, and financial deepening. Estimation methods include cross-sectional, pooled time series/cross-sectional, and panel data, utilizing a fixed effects estimator. Results highlight a spectrum of tax efforts, with South Africa exhibiting the highest and

Switzerland the lowest. The paper draws policy implications from these findings. Importantly, it critiques studies incorporating institutional variables unrelated to a country's tax base, arguing that such variables explain tax ratio differences between countries rather than measuring tax effort.

Al-Qudah (2021) investigates the determinants of tax revenue in Southeast Asia, utilizing a balanced dataset of eight countries. Employing various regression techniques, including static models like pooled Ordinary Least Squares (OLSs), fixed effects (FEs) model, random effects (REs) model, and Driscoll-Kraay standard error, as well as dynamic panel data through the system-generalized method of moments, the research identifies key factors influencing tax revenue. The study finds that the openness of the economy, foreign direct investment (FDI), the ratio of foreign debt to gross domestic product (GDP), and the share of value added in industry to GDP positively impact tax revenue. Conversely, official development assistance has a negative impact.

The implications suggest that Southeast Asian countries could enhance tax revenue by improving policies related to international trade, attracting FDI, expediting economic restructuring, and strengthening the capacity to mobilize, manage, and utilize foreign debt and assistance. The research provides valuable insights for policymakers aiming to optimize tax collection in the Southeast Asian context.

Hà, Minh, and Binh (2022) focus on identifying the determinants of tax revenues (TXRs) in Jordan for the period 1990-2019. The research utilizes the ARDL Bound test for co-integration, ARDL Long Run form, and ARDL Error Correction regression to examine hypotheses. The findings reveal a long-run relationship between factors such as per capita GDP (LPCI), fiscal deficit (FD), government expenditure (GE), foreign aids (FAID), industrial sector value added (INDUST), and economic openness (OPEN) with tax revenues in Jordan. Specifically, per capita GDP, fiscal deficit, and government expenditure exhibit positive and significant impacts on tax revenues in both the short and long run. In contrast, foreign aids have a negative and significant impact on tax revenues. The industrial sector value added and economic openness show positive and significant impacts in the short run but become insignificant in the long run. The study suggests that per capita GDP, fiscal deficit, foreign aids, and government expenditure are crucial determinants of tax revenues in both short and long run, while industrial sector value added and economic openness play significant roles in the short run.

e Soares, Reis, and Catarino (2023) investigate the municipality is the circumscription of the territory in which citizens, associated by common relations (locality, work, and traditions) live under an autonomous organization, for economic, administrative, and cultural purposes. The powers to define the tax burden in each municipality raise the question of municipal competitiveness. This study aims to analyze the determinants of municipalities' tax policy options, at the level of municipal tax attractiveness. Presently, the attribution of tax powers has extended to the sphere of local power, where municipalities can decide, in relation to their taxes, to grant tax benefits and reduce the municipal tax burden, that is, tax policy has become a general policy instrument of local authorities. In this context, supported by an international dogma favorable to the increasing attribution of administrative and financial autonomy, the fiscal competence of Portuguese municipalities has been extended. In this exploratory study, we analyzed the impact of the municipal competence of annual differentiation of the tax burden to observe the ability of local actors to increase municipal competitiveness and local development.

Yuliadi (2023) aims to identify the variables that serve as determinants of local government revenue in Indonesia. Utilizing panel data regression analysis for 34 provinces in Indonesia spanning 2016-2021, the research incorporates various variables including local government revenue (LGR), gross regional domestic product (GRDP), road length (RL), domestic investment (INV), population (Pop), human development index (HDI), and foreign direct investment (FDI). Through Chow test, Hausman test, and LM test results, the study concludes that the fixed effect model (FEM) is the most suitable. The findings indicate that all variables significantly impact LGR values, except for foreign direct investment (FDI) and road length (RL). Notably, population (Pop), domestic investment (INV), human development index (HDI), and gross regional domestic product (GRDP) are identified as variables with substantial influence on the increase in local government revenue.

The research recommends formulating integrated policies between local governments and stakeholders at each district or city level to stimulate rapid economic development and enhance economic independence by improving the investment and business climate.

3. Overview of the Tax Local Structure in Morocco

In Morocco, local income taxes reached 31.33 billion MAD (Source: Kingdom's General Treasury), an increase of 1.5% compared to their level at the end of December 2022. Moreover, the resources managed by municipalities amounted to 8444 million MAD, while resources managed on behalf of the State amounted to 7955 million MAD. Additionally, resources transferred stood at 14,937 million MAD (**Figure 1**).

At the end of the year 2023 the resources managed by the state on behalf of local authorities saw a significant increase rising from 7415 billion MAD to 8162 billion MAD representing a growth of 10.1%. This growth is fueled by various sources of revenue, with the municipal services tax being the largest contributor at 4143 billion dirhams, accounting for 50.8% of the total. The professional tax also contributes significantly with 3.6 billion dirhams, representing 44.1% of the total revenue. Lastly, the property tax, although smaller in amount, plays a notable role by contributing 419 million MAD (5.1% of total revenue). This highlights the significant role these taxes play in the shaping of local dynamics in

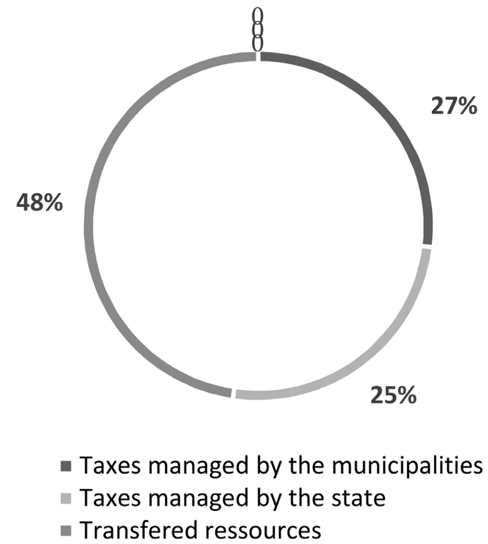

Figure 1. Structure of local municipalities revenues in 2023. Source: Monthly bulletins of local finance statistics, Kingdom's General Treasury.

Morocco (Figure 2).

The evolution of the structure of resources for local authorities between the end of December 2022 and the end of December 2023 highlights a decrease in the proportion of transferred resources, coupled with an increase in the proportion of resources managed by the State and the proportion of resources managed by local authorities.

4. Data, Methodology and Model

4.1. Data

Based on a review of the existing literature, the present paper chose the components of income taxes (housing tax, municipal services tax, professional tax, other local taxes, and fees) as well as control variables such as (Population, Density…) as independent variables.

For this purpose, we used the most comprehensive data available from the financial records of municipalities. This dataset covers the period from 2018 to 2023 and encompasses financial information from eight municipalities in Morocco (Table 1).

4.2. Methodology and Model Specification

The approach adopted in this research is mainly quantitative.

The objective was analyzing a set of data previously collected to observe the evolution of local income taxes based mainly on revenues managed by municipalities and the local tax administration. Based on the theoretical and empirical literature review and selected variables, we define the following equation used later for estimation:

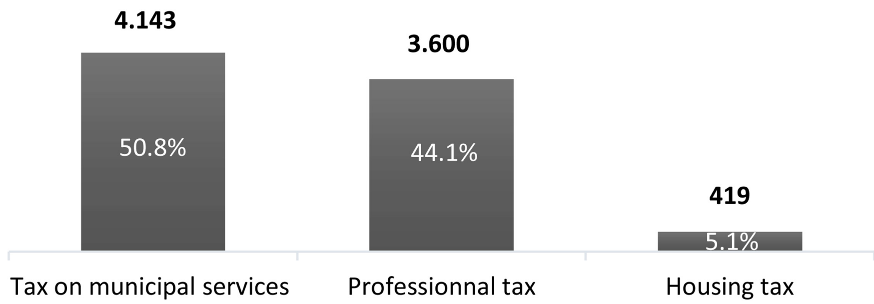

Figure 2. Structure of revenues managed by the state for the year 2022 (in %). Source: Monthly bulletins of local finance statistics, Kingdom's General Treasury.

Table 1. Description of variables.

Variables	Description
LT	Local fiscal tax refers to the revenue generated through numerous taxes imposed by the local authorities within the municipalities of Morocco.
MST	Municipal services tax is fiscal levies imposed by local authorities, typically to finance local public services provided to the population.
HT	Housing tax is a local tax levied on the value of real estate properties owned by individuals or legal entities within the municipality's jurisdiction.
PT	Professional tax is a local tax imposed on individuals and entities engaged in professional activities within municipality's jurisdiction.
OTF	Other local taxes and fees.
Pop	Population refers to the number of inhabitants of all age and backgrounds living within the administrative borders of a municipality.
Density	The density is measured as the number of people per square kilometer of land area within the municipality's borders.

$$\Delta\mathrm{LT} = f\left(\mathrm{MST}, \mathrm{TH}, \mathrm{PT}, \mathrm{OTF}\right) \tag{1}$$

If we propose to capture the short and long-term impact of the above explanatory variables on growth, the structure of the model of our function will be specified as follows:

$$\begin{aligned}\Delta\mathrm{LT}_{(t)i} = {} & \beta_1 + \beta_2\mathrm{LT}_{it-1} + \beta_3\mathrm{MST}_{it} + \beta_4\mathrm{HT}_{it} + \beta_5\mathrm{PT}_{it} \\ & + \beta_6\mathrm{OTF}_{it} + \cdots + \beta_7\mathrm{Pop}_{it} + \beta_8\mathrm{Dens}_{it} + \varepsilon_{it}\end{aligned}$$

with

$\Delta\mathrm{LT}_{(t)i}$ = Evolution of local income tax;

i = municipality ($i = 1,\cdots,8$ for the eight municipalities);

t = year ($t = 1,\cdots,5$ is for the six years 2018-2023);

β_1 = Constant;

MST = Municipal services tax;

HT = Housing tax;

PT = Professional tax;

OTF = Other local taxes and fees;

Pop = Population;

Dens = Density;

ε = Error term.

To recap, the test specification of Hausman (1978) is a specification test of individual effects. It is used to discriminate between fixed and random effects. The hypothesis tested concerns the correlation between the individual effects and the explanatory variables. Thus, under H0, the model can be specified with random individual effects, and we must retain the estimator generalized least squares MCG (BLUE estimator). Under the alternative hypothesis H1, the model must be specified with fixed individual effects retaining the within estimator (unbiased estimator). Under H0, the statistic H is asymptotically a chi-square (χ^2) with K degrees of freedom.

5. Results and Discussions

In this section, we are going to present our results. First, we determine which model provides the best fit for our data. Next, we identify and discuss significant predictors. The results of estimations are reported in **Table 2**.

Table 2. Results from estimation.

Dependent Variable: LT	OLS Model	Fe Model	Re Model
Cons	3.81 (0.097)**	−2.91 (0.087)***	3.81 (0.0581)***
$LT_{(t)i}$_lag1	−6.18 (0.019)**	−1.80 (0.580)**	−6.18 (0.095)***
ln_MST_{it}	3.22 (0.087)***	−2.69 (0.429)**	3.22 (0.076)***
ln_HP_{it}	1.11 (0.099)***	9.81 (0.0378)**	1.11 (0.089)***
ln_PT_{it}	4.74 (0.020)**	−5.47 (0.025)**	4.74 (0.017)**
ln_OTF_{it}	2.29 (0.045)**	3.64 (0.422)**	2.29 (0.032)**
ln_Pop_{it}	−3.39 (0.069)***	2.53 (0.086)***	−3.39 (0.057)**
ln_$Dens_{it}$	3.42 (0.099)***	5.11 (0.078)***	3.42 (0.089)***

Notes: Standard error in the parenthesis. ***, ** and * significant at 10%, 5% and 1% levels, respectively. The Hausman test statistic is the Hausman test, with *p*-value in parentheses.

According to the estimation results, specifically, Hausman test statistics, we find that the estimates used will be those of models with random individual effects. The Hausman test accepts the hypothesis of no correlation between the random term and the explanatory variables of the model (p-value = 0.3590 > 0.05).

The econometric analysis, as depicted in **Table 2**, offers quantitative insights supporting the interpretations made concerning the relationships between local income tax (LT) evolution and key explanatory variables within the context of Moroccan municipalities.

Notably, the consistently negative coefficient for the lagged value of LT across all models (OLS Model: −6.18; Fe Model: −1.80; Re Model: −6.18) confirms the persistence of past local income tax levels' negative impact on its current evolution, implying a system with inherent feedback mechanisms or inertia. This suggests the presence of feedback mechanisms or inertia within the tax system, where previous tax levels influence subsequent ones.

Concurrently, positive coefficients for taxes on municipal services (MST), housing (HT), professional activities (PT), and other local taxes and fees (OTF) across all models (OLS, Fe, Re) (e.g. MST: 3.22, HT: 1.11, PT: 4.74, OTF: 2.29 in the OLS Model) underscore the substantial influence of these revenue sources on local income tax evolution, highlighting the reliance of municipalities on diverse revenue streams for fiscal sustainability (This joins the work of Delgado, Peñas, & Mayor, 2011). These findings elucidate the reliance of municipalities on these revenue sources for fiscal sustainability.

Additionally, the nuanced effects of population and population density are evident, with population density consistently exhibiting a positive relationship with LT evolution (Re: 3.42), while the impact of overall population on LT varies across models, this suggests that while densely populated areas may generate higher tax revenues, overall population growth may not necessarily lead to commensurate increases in local income tax, possibly due to factors such as income distribution or demographic composition. The active population employed as a proxy could certainly have a better impact on the evolution of local revenues. These findings underscore the complex interplay between fiscal policies, demographic characteristics, and historical dynamics in shaping the trajectory of local income tax revenues within Moroccan municipalities.

6. Conclusion

This study sheds light on the significance of determinants of local tax revenues in Moroccan municipalities, focusing on the evolution of local income tax (LT) and its relationships with various explanatory variables. The results of the estimation models reveal significant associations between the evolution of LT and taxes on municipal services, housing, and professional activities, as well as other local taxes and fees. These findings underscore the municipalities' reliance on these revenue sources for fiscal sustainability.

Additionally, the population variable exhibits nuanced effects, suggesting that population density may positively influence the evolution of LT, while overall population growth may have a negative impact. These results demonstrate the importance of fiscal policies, demographic characteristics, and historical dynamics in shaping local tax revenues in Moroccan municipalities.

In conclusion, this study provides an in-depth perspective on the underlying mechanisms of local tax decisions and emphasizes the importance of nuanced understanding of interactions between economic, demographic, social, and political variables in the context of municipal taxation in Morocco.

Acknowledgements

This article was addressed within the framework of the Good Financial Governance (GFG) project of the Deutsche Gesellschaftfür Internationale Zusammenarbeit (GIZ Morocco).

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Al-Qudah, A. M. (2021). The Determinants of Tax Revenues: Empirical Evidence from Jordan. *International Journal of Financial Research*, 12, 43-54. https://doi.org/10.5430/ijfr.v12n3p43

Ayenew, W. (2016). Determinants of Tax Revenue in Ethiopia (Johansen Cointegration Approach). *International Journal of Business, Economics and Management*, 3, 69-84. https://doi.org/10.18488/journal.62/2016.3.6/62.6.69.84

Buettner, T. (1999). Determinants of Tax Rates in Local Capital Income Taxation: A Theoretical Model and Evidence from Germany. *Social Science Research Network*.

Delgado, F., Peñas, S. L., & Mayor, M. (2011). On the Determinants of Local Tax Rates: New Evidence from Spain. *Social Science Research Network*.

e Soares, R. de M., Reis, H., & Catarino, J. R. (2023). Determinants of Municipal Tax Rates: Empirical Evidence in the Portuguese Context. *Revista de Gestão e Secretariado, 14,* 13419-13443. https://doi.org/10.7769/gesec.v14i8.2001

Hà, N. M., Minh, P. H., & Binh, Q. M. Q. (2022). The Determinants of Tax Revenue: A Study of Southeast Asia. *Cogent Economics & Finance, 10,* Article ID: 2026660. https://doi.org/10.1080/23322039.2022.2026660

Hausman, J. A. (1978). Specification Tests in Econometrics. *Econometrica, 46,* 1251-1271. https://doi.org/10.2307/1913827

Maličká, L., Timková, M., & Vladimir Gazda, V. G. (2012). Determinants of Local Tax Revenues in EU Countries. *European Journal of Economics, Finance and Administrative, No. 52,* 120-126.

Piancastelli, M., & Thirlwáll, A. P. (2020). The Determinants of Tax Revenue and Tax Effort in Developed and Developing Countries: Theory and New Evidence 1996-2015. *Nova Economia, 30,* 871-892. https://doi.org/10.1590/0103-6351/5788

Pollastri, C., & Zanardi, A. (2015). The Determinants of Local Tax Setting in the Event of a Tax System under Reform: The Case of Italian Municipal Property Tax. *Politicaeconomica, Societàeditrice il Mulino, 31,* 355-376.

Yuliadi, I. (2023). Determinants of Local Government Revenue: A Survey of Regional Economic Development in Indonesia. *Quality Access to Success, 24,* 204-221.