

# Potential for Property Taxation in Dakar, Senegal

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*based on research joint with Victor Pouliquen (Oxford) and  
Bassirou Sarr (PSE)*

Property Taxation and Land Value Capture in Africa  
African Tax Institute and Lincoln Institute - May 2021



# Overview of the Project

- ▶ We partnered with the Senegalese National Tax Administration  
*Direction Générale des Impôts et Domaines, DGID*
- ▶ ...to develop a modernized property tax management system
- ▶ ...which is being evaluated through a Randomized Control Trial
- ▶ → The objective of the new system is to digitize most steps of the fiscal chain, from the property census in the field, to the production and distribution of tax notifications

# Overview of the Project

1. Diagnostic and needs assessment  
*[started August 2017]*
2. Development of the modernized property tax protocol
3. Collaborative Development of open-source Software  
Research team + Tax Administration + Dakar based IT company
4. Baseline data collection to measure Tax Gap
5. Digitization of cadastral data and calibration of property valuation formula
6. Roll-out of property tax census [*Paused due to the pandemic. Resuming May/June 2021.*]
7. Measuring short and medium term results using administrative and survey data

# Outline

Overview of the Project

Context and Property Tax Gap

New property tax management digital tool

Testing a simplified valuation method

Discussion

# Outline

Overview of the Project

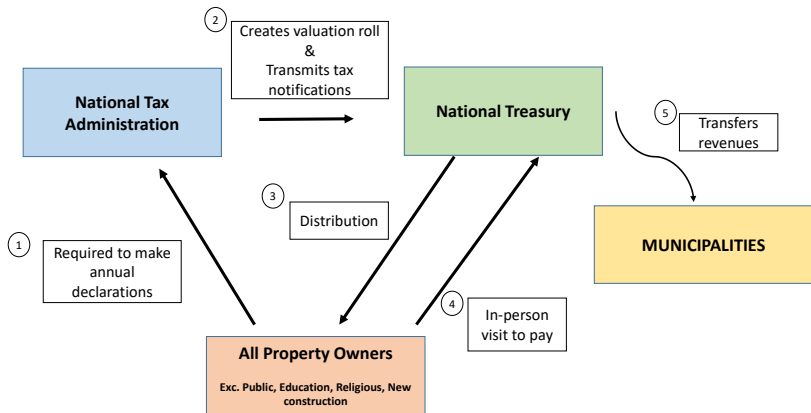
**Context and Property Tax Gap**

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# Property taxation in Senegal



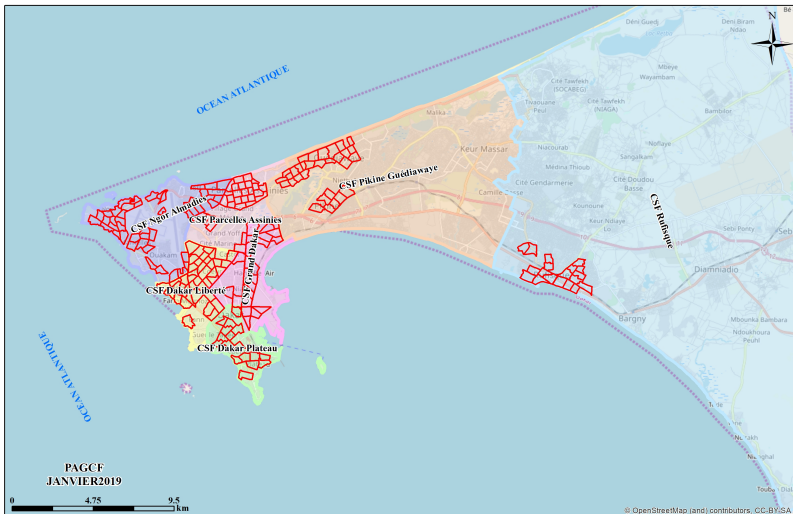
# Property taxation in Senegal

- ▶ All property owners annually subject to: 5% (property tax) + 3.6% (garbage tax) of the *annual market rental value* of the property
- ▶ But only 15 percent of all plots of the region are registered on the valuation roll (55,000 against 374,000)
- ▶ The values and addresses on the roll are outdated, and the Treasury only collects 27 percent of assessments
- ▶ In a representative survey of owners in areas with tax potential we find that:
  - ▶ 19.7 percent of owners are in the Tax Net - *received a tax notification or paid the tax*
  - ▶ Only 9 percent of potential revenue is collected

# Property owner survey

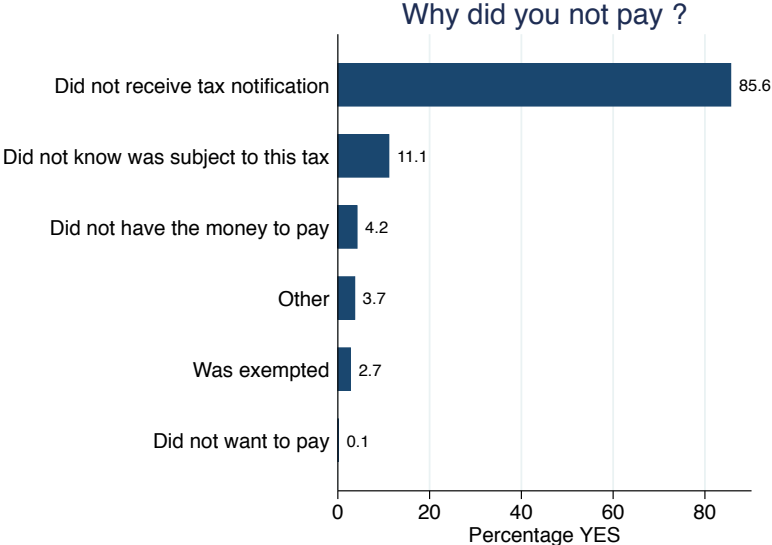
194 Cadastral Sections. 2,474 respondents.

## Centres des Services Fiscaux de Dakar: Sections éligibles PAGCF





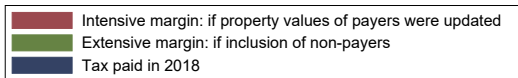
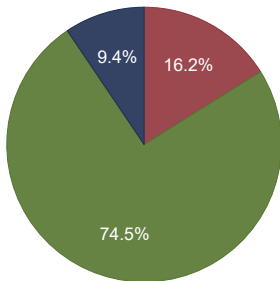
# Property owner survey



# Property Tax Gap

## Property Tax Gap

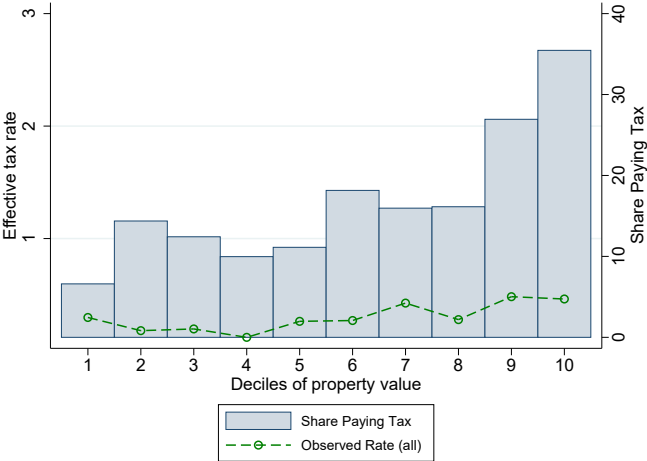
The pie represents total theoretical tax revenue from survey sample



Total theoretical revenue in weighted sample is XOF 9.7 billion

# Property Tax Gap

## Deciles of property value



## High and growing untapped potential

*“Dakar’s residential rents have risen continuously over the past two decades, and now often rival rents seen in large European cities”;*

*“Rents in Dakar’s downtown Plateau district are almost twice those in the central business district of Abidjan”;*

Property prices have grown by 256 percent between 1994 and 2010.

(Global Property Guide, 2014,  
ANSD-National statistical agency, 2012)



**GlobalPropertyGuide**  
Country Analysis | News | Trends & Stats | Comparisons | Buy Property | Investments

AFRICA | ASIA | CARIBBEAN | EUROPE | LATIN AMERICA | MIDDLE EAST | NORTH AMERICA | PACIFIC

**Financial Overview**  
PROPERTY IN SENEGAL

Overview | Market in Depth | Rental Yields | Taxes and Costs: Income Tax et al | Tax Example | Taxes if Resident | Buying Guide | Landlord and Tenant | Property Inheritance

**Senegal**  
Home > Africa > Senegal > Price History

**Senegal’s property boom continues**  
December 27, 2014

Senegal’s capital, Dakar, is in the midst of a property boom. Luxury villas, hotels and shopping centres have sprung up in the country in recent years, more particularly in Dakar’s coast.

# Outline

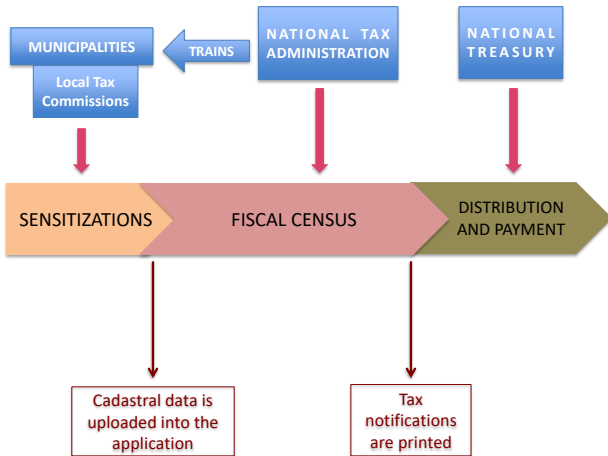
Overview of the Project

Context and Property Tax Gap

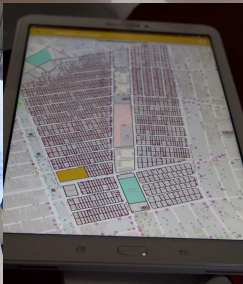
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# Property Tax Census in the field



**Situation du lot**  
Le lot correspond à la totalité d'un b.   
*Sur quel niveau se situe le lot?*

**b**

**Localisation du lot sur le niveau?**  
Gauche

**Type de Lot**  
Maison individuelle

**Croquis**  
M

Nom complet du propriétaire

Prénom du propriétaire

**Propriétaire a été rencontré**  
 Oui  
 Non

**Statut du propriétaire**  
Personne physique

Adresse propriétaire si différent

Nom et/ou Téléphone du Propriétaire

Adresse mail du propriétaire

Commune(s)  
NGOR

Section(s)  
000

NICAD/Num Parcelle(s)  
01 13013200900099

Prénoms et noms de l'agent communaux(s)  
Justine Knebelmann

Date du système (date d'installation)  
Mon Oct 07 15:10:25 GMT+02:00 2019

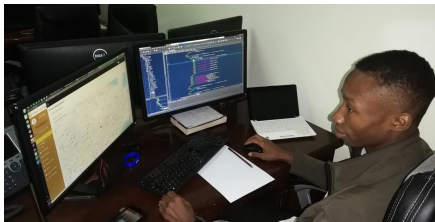
Code de Rue ADM

Nom de Rue

Numéro de Porte ADM/BAMO

**Type de parcelle**  
 Parcelle éligible pour la contribution sur le foncier bâti  
 Immeuble à usage scolaire, médical, ou religieux non productif de revenus fonciers  
 Bâtiment appartenant à l'Etat ou collectivité locale à usage de service public  
 Bâtiment totalement en chantier avec aucune partie habitable  
 Ouvrage pour distribution de l'eau potable ou d'électricité et appartenant à l'Etat ou collectivité locale (SENELEC, ONAS)

# Information management in the office



**Recherche**

Commune:  Ville:  Parcelle:

Préciser Recherche:  Préciser Contribution:

Mot-clé:

ID	NUMERO DE CONTRIBUTION	NUMERO DE PARCELLE	COMMUNE	VILLE	DATE DE CREATION	TYPE	STATUT
1	2019-00001-00000000000000000000	01 001 000 0000 00	NGOU	DIP 1 Arakoua	16/12/2019	habitat/urbain	logement
2	2019-00001-00000000000000000000	01 001 000 0000 00	NGOU	DIP 1 Arakoua	16/12/2019	habitat/urbain	logement
3	2019-00001-00000000000000000000	01 001 000 0000 00	NGOU	DIP 1 Arakoua	16/12/2019	habitat/urbain	logement
4	2019-00001-00000000000000000000	01 001 000 0000 00	NGOU	DIP 1 Arakoua	16/12/2019	habitat/urbain	logement

**Fond de carte**

Zone géographique

- Zone géographique
- Etat actuelle
- Parcelles
- Parcelles
- Parcelles
- Parcelles

**Tableaux de bord**

Parcelles sélectionnées

Commune: NGOU

Parcelles sélectionnées

Type état	Etat sélectionné	Total	Recherché
logement			
logement			
logement			
logement			
logement			
logement			
logement			
logement			
logement			
logement			

**FICHE D'ÉVALUATION**

Localisation du lot ?

Type de parcelle: Parcelle éligible pour la contribution sur le foncier bâti

Nombre étage bâtiment:

Nombre de lot:

Méthode d'évaluation: Méthode classique

Valeur locative annuelle: 28800000

Commentaire: Le lot correspond à la façade d'un bâtiment

Situation du lot:

Valeur locative annuelle: 28800000



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# Why test a simplified valuation method?

Standard method in the field:  
requires interactions &  
arbitrary

Existing fully fledged cadastral valuation: lengthy and expensive, ill-suited to expand the tax net rapidly

Simplified method: relies on characteristics visible from the outside + built area measured using high resolution images. Flexible for future improvements. Owners can testify of an official value if they come to the office.



Built Area	116.88
Floors	2
Total Area	350.62
Sector	100,000
Usage	Mixed
Fence: Type	Absence
Fence State	Standard
Wall: Ciment	Yes
Cladding: Type	Paint
Cladding: state	Bad
Tiles	No
Quality Doors and Windows	Bad
Landscape Improvement	No
Architectural Improvement	No
Garage	Absence
Shop	No
Balcony	Yes
Main Road	Off Main Road
Pavement	Tarmac
Sidewalk	Yes
Angle	No
Street Lights	No

# Property Valuation Formula

The application allows to choose between Standard and Formula methods, as well as to adjust the valuation formula

Annotations for 'Méthodes d'évaluation':

- Critère de recherche
- Assigner méthode d'évaluation
- Rechercher
- Modifier méthode d'évaluation
- Supprimer méthode d'évaluation

Nom de la méthode d'évaluation	Zone géographique	Méthode de point
01100 0001	0001	Méthode de point
01100 0002	0002	Méthode de point
01100 0003	0003	Méthode de point
01100 0004	0004	Méthode de point
01100 0005	0005	Méthode de point

Annotations for 'Critères d'évaluations':

- Critère de recherche
- Nouveau critère d'évaluation
- Rechercher
- Visualiser Fiche critère évaluation
- Modifier critère évaluation
- Supprimer critère

Nom Critère d'évaluation	Propriété critère	Zone de critère	Méthode
Engagement Personne	Engagement	Caractère	Méthode de point
Age	Engagement	Caractère	Méthode de point
Années d'habitation	Engagement	Caractère	Méthode de point
État	Engagement	Caractère	Méthode de point
Classe État	Engagement	Zone d'évaluation	Méthode de point

# Property Valuation Formula

- ▶ Covariates: Built area, dummies for geographical sector, 18 characteristics observable from the outside
- ▶ Elastic net regression chosen through cross-validation (vs full OLS; Lasso; all models with interactions)
- ▶ Coefficients = median of 100 iterations
- ▶ Performance of model is slightly inferior to what is found in developed countries, but same order of magnitude than in comparable settings (literature scarce)  $R^2 = 0.56$
- ▶ McCluskey et al (2013), Davis et al (2012), Franzsen & McCluskey (2017), Ali et al 2018

# Property valuation formula: Elastic net reg. using 100xfold cross validation

PREDICTING PROPERTY VALUE: ELASTIC NET REGRESSION RESULTS

	Log(Value)				
Log(Area)	0.31	Fence: Type		Quality Doors and Windows	
<b>Sector</b>		None	0.00	Very Good	0.14
10000	-0.39	Metal	0.00	Average	0.00
40000	-0.19	Wall	0.06	Bad	0.00
50000	-0.04	Wall w. wrought iron	0.00	<b>Landscape</b>	0.13
53000	-0.34	<b>Fence: State</b>		<b>Architecture</b>	0.00
65000	0.00	Very Good	0.00	<b>Garage</b>	
70000	0.00	Average	0.00	Simple	0.10
80000	-0.24	Bad	-0.06	Double	0.17
90000	-0.18	<b>Wall: Cement</b>	0.13	None	0.00
100000	-0.08	<b>Cladding: Type</b>		<b>Balcony</b>	0.05
110000	0.00	Wis	-0.01	<b>Road: Location</b>	
150000	0.06	Plain	-0.19	On Main Road	0.10
200000	0.20	Paint	0.00	Near Main Road	0.07
220000	0.00	Tiles	0.00	Off Main Road	0.00
300000	0.31	Stone	0.14		
<b>Floors</b>	0.21	None	-0.06		
<b>Usage</b>		<b>Cladding: State</b>			
Residential	0.00	Very Good	0.02		
Commercial	-0.19	Average	0.00		
Mixed	0.15	Bad	-0.04		
		<b>Any Tiles</b>	0.05		
<b>Road: Type</b>					
Tarmac		0.05			
Pavements		0.08			
Gravel		0.08			
Sand		0.00			
None		-0.04			
<b>Sidewalk</b>		0.00			
<b>Angle</b>		0.06			
<b>Street Lights</b>		0.04			
Constant		12.66			
N		1458			
Elastic Net Regression					
Cross-validation Iterations		100			
Mean RMSE		0.49			
Mean R2		0.56			

ELASTIC NET REGRESSION PERFORMANCE STATISTICS	
Mean R2	56%
Mean RMSE	0.49
MAPE	41
Freddie Mac 10%	16
Freddie Mac 20%	32
Freddie Mac 40%	62

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## First positive results

- ▶ High-level engagement and enthusiasm of the administration with respect to the new digital tool
- ▶ Strong acceptance and adoption of the new tool by field agents
- ▶ High quality and coverage of data collected in targeted sections (pre-pandemic)
- ▶ Plans to link with payment functionalities of the Treasury

# Challenges for discussion

- ▶ Identification of owner
  - ▶ Debates: plot identification is enough *versus* ID number of the owner is needed
  - ▶ Problem: the field agents are only able to collect owner identification details for around 20% of plots
- ▶ Load of incoming data for agents in office to validate
- ▶ Burden of the distribution of these extra new tax notifications
- ▶ Improving the *enforcement* side of the fiscal chain



THANK YOU !  
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# Experimental Design

