

# TAX HOUSING OR LAND? DISTRIBUTIONAL EFFECTS OF PROPERTY TAXATION IN GERMANY

Rafael Barbosa\*<sup>1</sup> and Simon Skipka\*<sup>2</sup>

<sup>1</sup>IMF

<sup>2</sup>German Federal Ministry of Finance

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\*The views expressed herein are those of the authors and do not necessarily reflect those of the respective Institutions, Executive Board, or management.

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- **Research Question:** What are the aggregate and distributional effects of replacing a property tax based on house values with a LVT?
- **This project:**
  - We offer new empirical evidence on the distributional impact at a household level of a switch from housing taxation to LVT, building a unique data set for Germany.
  - We build the first theoretical model which incorporates both the distributional impacts and the efficiency gains from adopting a Land Value Tax.

## Empirical

- Papers on distributional consequences are **scarce and inconclusive** (regional analysis only):
  - England and Zhao (2005): Data from New Hampshire → **Regressive LVT**.
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## Theoretical

- Theoretical **literature has focused on efficiency** and intergenerational inequality (OLG models).
- We **contribute to the literature** by building the first model which replicates our novel empirical findings and allows for policy experiments which captures efficiency-equity trade-off in a model with heterogeneous households and regions.

## ● Empirical

- Average **land value share** is 33% with **substantial dispersion**, between and within regions.
- We find **potential for substantial differences in tax burdens** under the different regimes.
- Concerning **relation with income**, we find a revenue neutral switch to a LVT to be slightly regressive (in partial equilibrium).

## ● Model

- Switch to a land tax leads to **more investment** in structures and **lower housing rents**, benefiting renters.
- **Slight regressive tendency** for landowners. **Most landowners benefit** or are mostly unaffected.
- **Social welfare improves** with a land tax.

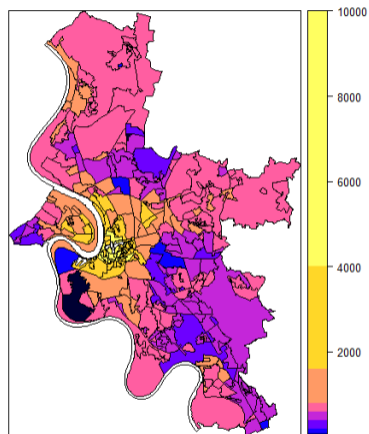


FIGURE: Land value data for the city of Dusseldorf in € per  $m^2$ . Log scale.

- Start from **German Household Survey (SOEP)** for **2017** and expand it with
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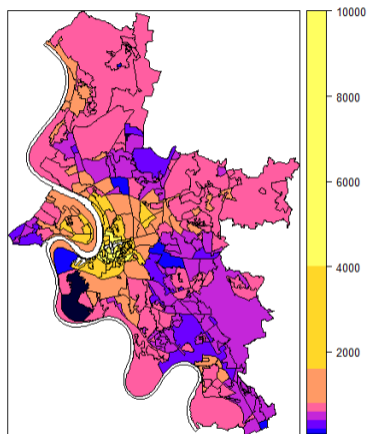


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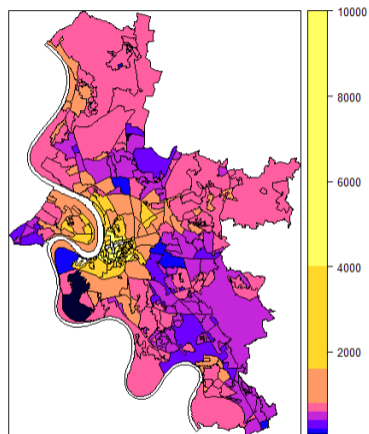


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- Data on five German States → Condition on primary residences of **homeowners**
- **Geographically match** the location of each household in the survey to its respective land value and lot characteristics.

# REGIONAL RESULTS

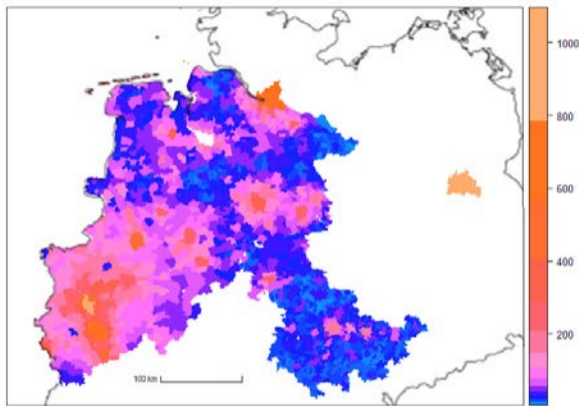
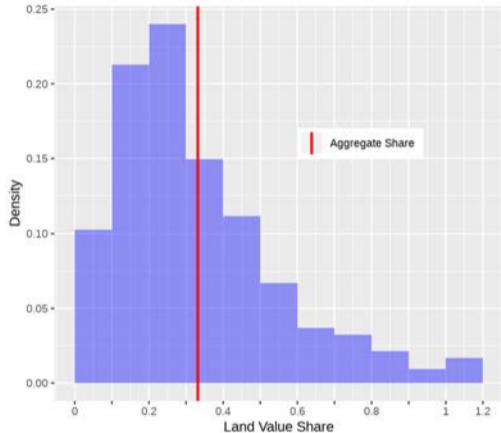


FIGURE: Map of Average Municipality Land Prices for the German states in sample.  
Log scale.

- Large **regional heterogeneity** in average land values.
- **Exponential** growth in cities (and within cities)
- Total land value is 1.5€ trillion, **1.2 times GDP** → Annual land rents between 4 and 10% of output in developed nations.
- 90% is non-agricultural land.
- Average revenue revenue land value tax rates are 0.6% on average.

# DISTRIBUTIONAL RESULTS



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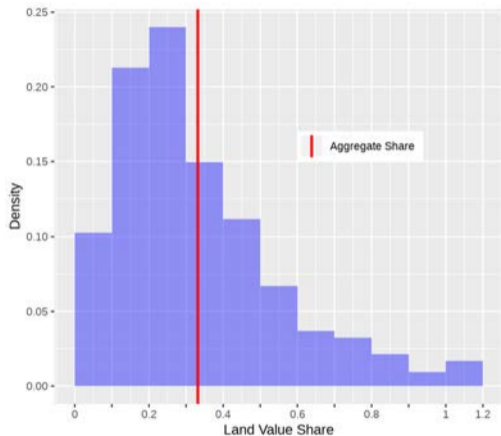


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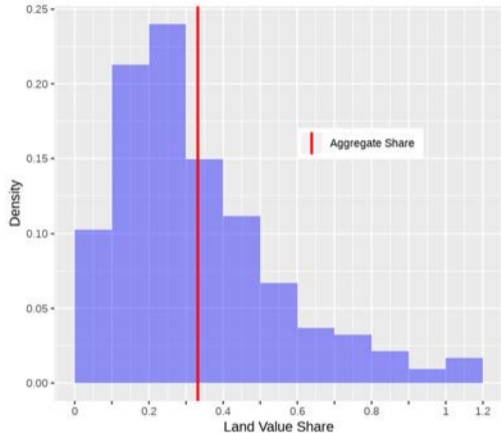


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- Land values are more concentrated than House values.
- Average Land Value Share (LVS) of full sample is 33% (regional heterogeneity).
- Substantial dispersion → potential for large changes in tax burden.
- Novel findings on LVS
  - Large heterogeneity within region.
  - Substantial dispersion within income level.
  - Negative correlation with income within region. → **Equity cost.** [More](#)

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- Capital supplied at **exogenous interest rate** from international markets.
- **Land in fixed supply** within each region  $z$ :  $T_{L,z} + T_{F,z} = T_z$ 
  - Exogenous share of land held by a housing firm ( $T_F$ ) which rents housing to renter households and consumption good firm.
  - Rest of land held by landowner households ( $T_L$ ).

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- **Fixed total share of Renters and Landowners** in the economy spread across the two regions. **Renters can move** between regions; **Landowners cannot**.
- **Mechanism**: House value tax increases marginal cost of structures investment (of households and housing firm) through higher tax burden, decreasing housing in the economy. Land value tax does not. [More](#)

# POLICY EXPERIMENT - AGGREGATE

	Urban	Rural
Prices		
Wage	0.28	0.31
Price of Housing	-2.14	-0.78
Price of Land	-3.59	7.17
Quantities		
Population	-1.30	4.35
Structures (Firm)	2.06	7.93
Housing (Firm)	0.84	6.96
Structures (Landlords)	2.36	5.18
Housing (Landlords)	1.77	5.04
Output	-0.84	3.78
Renters		
Consumption	0.29	0.11
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- **Renters benefit** (especially in urban regions)

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- Overall, social **welfare improves** with a land tax due to effect on renters and rural landowners.

- Empirical
  - Household level dataset based on official land values.
  - Identify household **distributions of land and house value** and their **relation to income**.
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- Land tax shows promise, but implementation should consider adverse distributional effects.

**THANK YOU!**

# APPENDIX

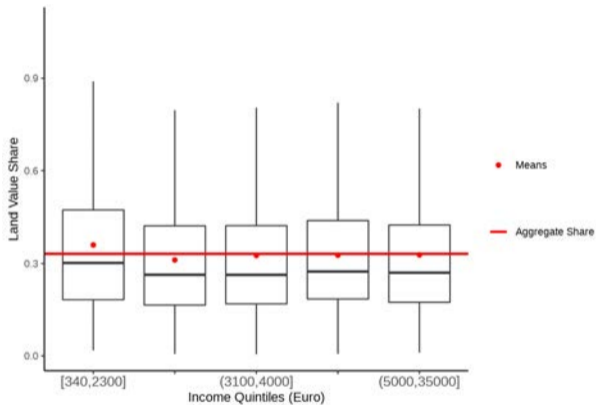
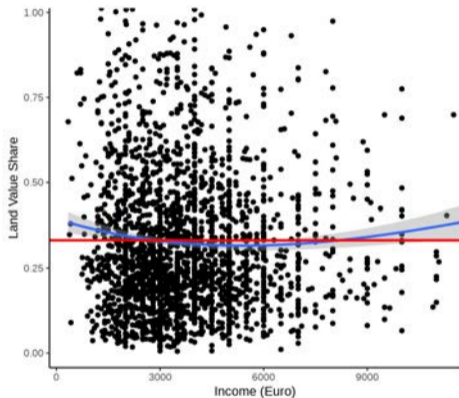
# LAND VALUE SHARE AND INCOME

	(1)	(2)	(3)
Intercept	-1.191*** (0.246)	-2.781*** (0.068)	-1.599*** (0.224)
Average Land Value		0.294*** (0.014)	0.310*** (0.014)
Income	-0.019 (0.030)		<b>-0.155***</b> (0.028)
N	2359	2359	2359
R <sup>2</sup>	0.000	0.164	0.174

TABLE: Log-log regressions of household Land Value Share.

- Average land value of region has a strong impact on LVS, around 0.3.
- Coefficient on income controlling for average land value: **-0.155**. [More](#)
- LVT is, on average, **less progressive** than a standard property tax at a regional level.
- **Reason:** Land value is more concentrated, but correlates less strongly with income than house value. [Back](#)

# LVS AND INCOME - FEDERAL IMPLEMENTATION



- OLS coefficient is not statistically different from zero. [Back](#)



# HOUSEHOLDS - LANDOWNERS

- **Intertemporal** problem. Choose consumption and investment in structures,  $s_{L,t}$ , (subject to depreciation).
- 25 i subtypes ( $\{\theta, \eta\}$  pairings):
  - 5 Productivity ( $\theta$ ) subtypes
  - 5 Land holding ( $\eta_T$ ) subtypes

$$\max_{\{C_{Li,t}, S_{Li,t}\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \beta^t \frac{(C_{Li,t}^\gamma H_{Li,t}^{1-\gamma})^\sigma}{\sigma} \quad (1a)$$

s.to

$$(1 - \tau^L)\theta_{Li}w_{z,t}L_{Li} - \tau_z^H p_{z,t}^H H_{Li,t} - \tau_z^T p_{z,t}^T \eta_{T,i} T_{L,z} + \eta_{F,i} \Pi_{H,z} \geq C_{Li,t} + p_{z,t}^S s_{Li,t} \quad (1b)$$

$$H_{Li,t}^S = G(\eta_{T,i} T_{L,z}, S_{Li,t}) = \phi_H \left[ a S_{Li,t}^\chi + (1 - a)(\eta_{T,i} T_{L,z})^\chi \right]^{\frac{1}{\chi}} \quad (1c)$$

$$S_{Li,t} = (1 - \delta)S_{Li,t-1} + s_{Li,t} \quad (1d)$$

- Pay taxes on labor earnings and **house rents** or **land rents**.
- Produce housing using land and structures with CES function.

Back

- **Housing tax increases marginal cost** of investment in structures **today** and **tomorrow**.

$$\frac{\partial U}{\partial H} \frac{\partial H}{\partial S} + \beta(1 - \delta) \frac{\partial U}{\partial H} \frac{\partial H}{\partial S} = \lambda_{L,t} \left[ p_{z,t}^S + \tau^H p_{z,t}^H \frac{\partial H}{\partial S} \right] + \lambda_{L,t+1} \left[ \tau^H p_{z,t+1}^H (1 - \delta) \frac{\partial H}{\partial S} \right]$$

- **Taxation of land rents** does not distort marginal incentives to build structures, nor does it reduce the overall quantity of land in the economy.
- Housing firm (owns rest of the land) is subject to a similar problem, which will impact its profits.
- Solve recursive problem computationally.

Back

- Problem of housing firm:

$$\max_{\{S_{F,z,t}\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \beta^t \left[ (1 - \tau_z^H) p_{z,t}^H H_{F,z,t} - p_{z,t}^S S_{F,z,t} - \tau_z^T p_{z,t}^T T_{F,z} \right] \quad (2a)$$

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- **Inputs:** Land and Structures (CES with constant returns to scale). Chooses structures to buy from structures' firm.
- **Sells** housing services to **renter and consumption good firm** (apartment vs. office buildings.)
- Pays **taxes** on housing or land, like landowner households.
- **Price of land** = marginal productivity of land
- **Profits** (rents from land and existing structures) distributed to landowners.

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  - Share of homeowners in urban regions (44%).
  - Size of urban and rural regions (determined using municipal and land value data).
  - Average regional land value shares.

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- **Tax on housing** set to match percentage of property tax revenue in GDP (1.2%). [Back](#)



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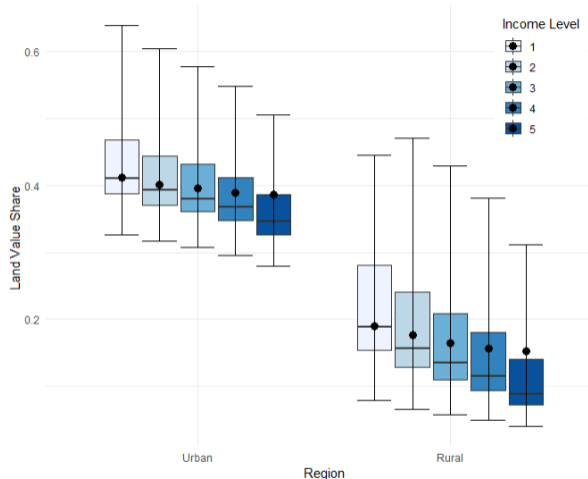
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# POLICY EXPERIMENT - DISTRIBUTIONAL 2

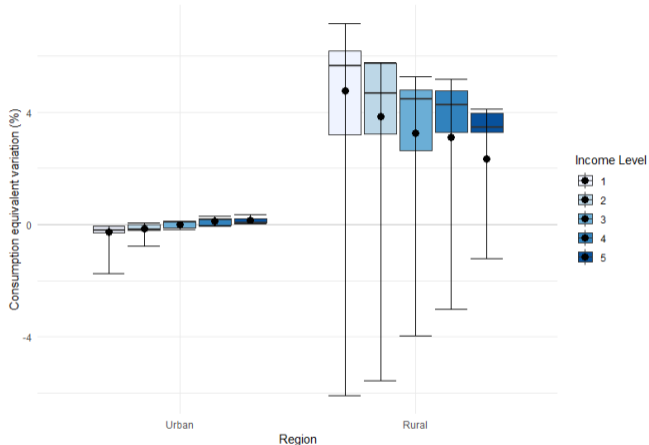


FIGURE: Change in welfare from switching to land tax (consumption equivalent variation).

- Bigger changes in rural region
  - Bigger impact
  - Different relative size of housing firm
- In rural region, most benefit.
- Landowners with **high land holdings** can lose significantly (especially rural and low income)
- **Social welfare increases** under a LVT [Back](#)