

A Stata 17 implementation of the local autonomy ratio: Calling Python

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SUMMARY

- 1 Introduction: The Local Autonomy Ratio
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SUMMARY

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Introduction: The Local Autonomy Ratio

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How Python can help

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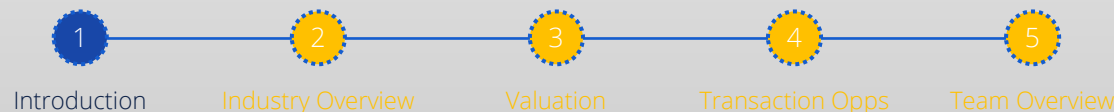
Applications

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Do-file execution

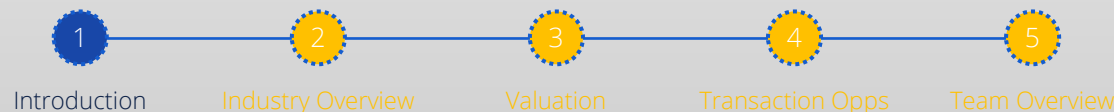
Introduction: The Local Autonomy Ratio

- Countries whose public sector is decentralized: +Efficiency in public services
- Level of decentralization approximated through the **Local Income Ratio**
 - **but** it has been proven that this covariate is **endogenous**
 - **and** due to the **unobservable heterogeneity**



Introduction: The Local Autonomy Ratio

- In **Chile**, the participation of the **Municipal Compensation Fund (FCM)**, in the total revenues of the municipality, is the best **indicator of decentralization** (Letelier and Sáez-Lozano, 2020)
- In 2011, Martínez-Vazquez, Vulovic, and Liu paper:
 - an **instrument variable (V_{st})** shall be used to test the robustness of the empirical model
 - to control for **possible measurement errors** of the FCM
 - and detect **endogeneity biases**



Introduction: The Local Autonomy Ratio

- Martínez-Vázquez et al. (2011) and Sanogo (2019) define the **instrumental variable** of municipality s in year t , V_{st} :
- $$V_{st} = \frac{1}{\sum_{m=1}^M \frac{1}{d_m}} \sum_{m=1}^M \frac{1}{d_m} FCM_{mt}, s \neq m \mid d_m \leq \bar{d}$$
- where, d_m is distance between municipality s and m ; FCM_{mt} is FCM of the municipality m in year t ; M is the total number of municipalities; d_m is the distance between municipality m and the other municipalities in the country; \bar{d} is the threshold distance.



Introduction: The Local Autonomy Ratio

- Letelier and Sáez (2020) modified V_{st} to apply it to Chile, including, also to the "distance" restriction, the population size limit:

$$V_{st} = \frac{1}{\sum_{m=1}^M \frac{1}{d_m}} \sum_{m=1}^M \frac{1}{d_m} FCM_{mt}, s \neq m \mid d_m \leq \bar{d} \text{ and } Pob_{st} \geq \overline{Pob} \quad (2)$$

- where, Pob_{st} is the population of municipality s in period t ; and \overline{Pob} is the threshold population.

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Why python?

- To compute the instrumental variable “v” for the Improved Local Autonomy Ratio we face:
 1. Large dataset (a matrix with distances between every single pair of municipalities in a given country)
 - a) e.g.: In Chile there are 343 municipalities, we have to deal with a 343x343 matrix
 2. Necessity to update the dataset (Possibility to use API's for data scrapping)
 3. Apply different restrictions
 - a) minimum distance between towns
 - b) or a minimum population per town



Why python?

4. Automate its calculation to facilitate its application
 - a) Allow non-python users to take advantage of Stata's power
 - b) Attract python users to use the best Stata features vs python (Econometrics)
5. Explore Stata 17's newest python features
 - a) SFI library
 - b) Pystata (writing Stata code in Jupyter Lab)
 - c) ...



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The code: Calculating the Improved Local Autonomy Ratio (Vst)

- The structure:
 1. Python: read the data (Excel, stata,...)
 2. Python: apply restrictions, calculated V for each municipality.
 3. Stata: Use the SFI module to load data back into Stata's Data Editor
 4. Stata: apply econometrics models to reveal possible correlations



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APPLICATIONS

- The instrumental variable V_{st} is a **covariate of the happiness model** that Letelier and Saez-Lozano (2020) estimated for the case of Chile, in the years 2011 and 2013.
- Since happiness is a latent variable, the **level of satisfaction** with individual life, as a **proxy** variable for happiness. The authors specified a multilevel model, in which one of the covariates was V_{st} .
- They used the Newton-Raphson algorithm to maximize the likelihood function, which is done according to the adaptive quadrature procedure proposed by Rabe-Hesketh et. al. (2005). The main conclusion that this research provides **evidence in support of the hypothesis that decentralization (V_{st}) increases the level of happiness of the Chilean population.**



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Thanks for your attention!

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