



A spatial-temporal assessment of the Land Value Development Tax



Nestor Garza^{a,*}, Colin Lizieri^b

^a Instituto de Estudios Económicos del Caribe—Universidad del Norte, Barranquilla, Colombia

^b Grosvenor professor of Real Estate Finance—Department of Land Economy, University of Cambridge, UK

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ABSTRACT

We use information of the period 2000–2010 to assess the land market neutrality of a Land Value Development Tax (LVDT) in Bogota (Colombia). This city introduced the LVDT in 2004 and it offers an excellent vantage point for observation of its effects because of these reasons: (a) the LVDT follows a clear spatial and temporal application process; (b) the LVDT is applied over an extended metropolitan area regulated by a single master plan throughout all the years of application of the tax; (c) the city comprises a single public authority for revenue and taxation purposes; and (d) there has been no previous historical experience with the use of this type of land exaction in the city or its region. The LVDT is a one-time exaction levied where regulatory or infrastructural state interventions determine price increases, making it a difficult assessment subject when compared to the pure land tax. However, the aforementioned characteristics of our case study allow us to test its static (lowering of land prices) and dynamic (no development timing effects) neutrality in an emerging urban environment, using single and multi-equation spatial panel techniques.

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1. Introduction

Although there has been a long tradition of land use planning in Latin America, it is argued that much of this policy has used inappropriate enforcement, land use regulation that favours the elite in societies, and has exhibited a lack of attention to formal economic planning tools. In this paper, we address these concerns by making a spatial urban economics analysis of the Colombian Value Capture strategy: *captura de plusvalía*.

Captura de plusvalía is a Land Value Development Tax (LVDT) that attempts to reduce unearned landowner gains. In particular, it is intended to capture windfall gains due to infrastructural or regulatory interventions in the urban space. This LVDT was introduced in national legislation in 1997 (Law 388) following a constitutional principle (Article 81–Constitution of 1991). However, these constitutional and legal principles have been implemented slowly, mainly because of political resistance. We consider that lack of formal assessment of its achieved results is one reason for this resistance and one rationale for undertaking this case study.

We use information of the period 2000–2010 to assess the land market neutrality of the LVDT of Bogota, Colombia's capital and

largest metropolis. This city introduced the LVDT in 2004, and it offers an excellent vantage point for observation of its effects because of these reasons: (a) the LVDT follows a clear spatial and temporal application process; (b) the LVDT is applied over an extended metropolitan area regulated by a single master plan throughout all the years of application of the tax; (c) the city comprises a single public authority for revenue and taxation purposes; and (d) there has been no previous historical experience with the use of this type of land exaction in the city or its region. These characteristics allow us to test the effects of an LVDT in an emerging urban environment, using single and multi-equation spatial panel techniques.

The paper uses spatial panel estimation where the land prices will depend on spatial and socio-economic variables extracted from urban land economics theory, and as a function of the LVDT rate per year and zones. It will be shown that the LVDT rate had a negative impact on land prices per year while not affecting corresponding building output per year. These results strongly suggest that the LVDT is market neutral, both in a static and a dynamic sense, a result in line with existing theory.

The paper is structured in 6 sections, the first being this introduction, while in the second we present a contextual and empirical literature review. In section three, we set an empirical framework for assessment while in the fourth section we introduce the case study and databases. The relevant empirical analyses are performed and presented in section five, while section six sets out our conclusions.

* Corresponding author.

E-mail addresses: ngarza@uninorte.edu.co (N. Garza), cml49@cam.ac.uk (C. Lizieri).

2. Land taxation: theoretical and empirical inquiries

2.1. Land taxation and spatial markets

A pure land tax is often considered the ideal source for public finance. This is because the perfectly inelastic supply of land allows the spatial land rents and land use structures as determined by market forces to remain once the tax is collected (Wildasin, 1988; Anas et al., 1998). This characteristic has been analyzed and theoretically demonstrated by following the so-called Henry George Theorem under different market and spatial structures (Arnott and Stiglitz, 1979).

However, a pure land tax has been an almost unattainable ideal because of legal resistance to valuations and procedures, or political power held by landowners. The split rate tax, a variation of the pure land tax, was used in the city of Pittsburgh. Oates and Schwab (1997), and Plassman and Tideman (2000) found that this policy was market-neutral, as theoretically expected.

In spite of its advantages, the pure land tax has not been widely used around the world. By comparison, the Land Value Development Tax (LVDT) has been an option that has led to less resistance, even though it might not necessarily share all the benefits of a pure land tax. The LVDT tries to re-capture for the local government the land prices increases due to regulatory or infrastructural interventions. However, even where it can be statically market-neutral, it may also delay or accelerate development timing and, thus, not respect dynamic neutrality.

According to Rose (1973, 1976), the LVDT is a one-time exaction to the instantly increased present value of future rents (the new land price) in a location subject to intervention. If the LVDT is levied when development permission is requested (and granted), the development timing of the corresponding plot of land might be a function of the tax rate and, in that sense, the tax would not respect dynamic market neutrality.

The work of Rose was contested by Neutze (1974), and Foster and Glaister (1975). These authors considered that the choice of a specific functional form for the present value of rents produces an effect from the tax rate to the development timing. Another flow of criticisms came from Evans (1983) and Needham (1981), because landowners' strikes may allow for the passing on of the tax to final land users via land holding.¹

The LVDT (and the pure land tax) can also fail if not all the spatial units inside a region apply it, that is, a spatial general equilibrium feedback effect (Brueckner, 1986). This effect occurs when the tax is applied in a spatial unit but not in its neighbors, meaning that the static-neutral land price decrease can be counterbalanced by development migration from other neighboring spatial units. There will be land price increases after the scattered spatial application of the tax.

The application of both pure land taxes and LVDTs has been resisted in Latin America, possibly because of its rural and landowner-biased political traditions (Sokoloff, 2012). Regardless of these limitations, Brazil and Colombia have recently implemented land value-capture strategies, in a context full of controversies.

The Brazilian value-capture strategy is named Solo Criado (Created Land) (Fernandes, 2011). Unfortunately there is scarce quantitative literature on the effects of this policy and, in particular, we still do not have a spatial, time controlled, metropolitan scale, and land oriented assessment.

¹ As one of the referees noted, landowners might also withhold land in anticipation of a legal or tax change in favor of their position. This falls outside the scope of this paper, although parallel work examining land monopoly effects addresses similar issues.

The Colombian value-capture is named Captura de Plusvalía, and it is an LVDT. It is set out in Law 388 of 1997, the current planning framework for this country. The Law states that all of its 1038 municipalities need a Master Plan including the use of value-capture tools. The LVDT has been used only in the cities of Bogotá, Medellín and Pereira, but it has proven to be operationally demanding and politically/legally resisted (Borrero and Duran, 2010).

2.2. Value capture assessments

Formal assessments of the Value Capture in Brazil or Colombia have been scarce, although we must recognize the pioneering effort by Borrero (2007) for Bogotá. This author used privately obtained appraisals and transactions information in a city section and detected a negative impact of the LVDT on prices. In comparison, our analysis has a testing framework that includes time and spatial controls, uses public information with geographic and social features, and it reaches a metropolitan scale.

In the international literature, we are very much aligned with the works of Ihlanfeldt and Shaughnessy (2004), and Ihlanfeldt (2007), as they use a full metropolitan scale urban economy model to test a land exaction strategy (the impact fee). But contrary to these authors, we do not assume a specific land price spatial function (they assume a cubic spline) and our time dimension allows us to use a 'change' in regulation approach and not a simple 'levels' of regulation approach (McLaughlin, 2012).

Lauridsen et al. (2013) is another precedent to our own research, as they use prices collected over time in relation to regulation and land tax in 25 municipalities in Denmark. They use housing price per city and regulatory variables impacting price in a spatial perspective. But these authors are not working with land prices (instead using house prices as a proxy), and their focus is on regulation not the land tax, which nonetheless, appears to have the expected negative impact on prices.

Bachis et al. (2011), constitutes our most immediate precedent as they assess the impact of a Land Transfer Tax (LTT) on housing along the boundary of a Toronto suburb by using a Difference-in-Differences (DiD) estimation. The authors found that the tax had decreased land prices although it was not market-neutral since transaction volumes slowed down. However, their transactions of fully developed properties mask the land prices that we directly analyse using appraisals.

All of these are valuable contributions; however we consider that the existing literature has not offered a more conclusive answer to the question surrounding the neutrality (static and dynamic) of the LVDT because they lack a case study with clear and comparable information pre and post-tax period. There is also scant research about this subject with a spatial, and metropolitan-scale perspective, while it is evident that there is lack of knowledge about this subject in developing countries. The combination of these characteristics is a contribution of this paper to the literature on land economics and policy.

3. An empirical framework for assessment

In this section we follow the determinants of land rents in a city where land rent in each zone i is a residual after discounting building costs. Differences in regulatory restrictions per zone imply higher land rents in the zones where the restrictions are less strong than the citywide standards. Basically, the higher the Floor-to-Area-Ratio (FAR), the higher the land rent:

$$r_i = \frac{q_i(P_i - c)}{L_i} \text{FAR}_i \quad (1)$$

where r_i = residual land rent (price) per m^2 , q_i building output quantity in m^2 , P_i price of the building environment per m^2 , c con-

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