



Development density, administrative decisions, and land values: An empirical investigation



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ABSTRACT

The paper addresses the links between planning uncertainty and land values, from theoretical and empirical perspective. We investigated land prices in a western part of Krakow (Poland) using a sample of 419 property sales from 2012 and 2014. We used spatial hedonic models to explore the relations between planning and building decisions, development density and land values.

We found that administrative decisions (development and building permits) are capitalized in sales prices. Land with valid Decision on Development Conditions sold for 27-29% more than comparable properties. The implicit value of Building Permit was even higher as it increased the sale price by 47-50%. Additionally, we observed that potential density of development has a positive impact on land prices, but the effect is stronger for institutional investors.

1. Introduction

Theoretical urban economics models suggest that potential land use has a strong impact on land values. On the other hand, in many developing countries with emerging real estate markets, land use planning is complicated and dependent on arbitral administrative decisions. Both timing and final outcome of any given decision are uncertain. As a consequence, land without valid decisions is a risky asset, thus planning risk should be discounted in the price paid for the property. Additionally, one can argue that in that latter case several real options cannot be effectively exercised. Not many studies addressed that problem from an economic perspective, and even fewer backed up arguments with empirical evidence. The paper goal is to fill this empirical gap, by studying land prices, in the dynamically changing urban setting of Krakow, one of the major cities in Poland.

The empirical research objectives are twofold. First, we assess the link between planning and building decisions issued by local government and values of land in Krakow. In particular, we check whether specific planning decisions (zoning, development and building permits) have a significant impact the sales prices using hedonic regression. Second, using the same methodological framework, we identify the relation between the potential density of development and the land prices.

The paper is organized as follows. In Section 2, we address theoretical background and previous research on links between land price,

land use, and potential development density. In section3, we describe planning rules in Poland, analyze land use planning in Krakow, and justify hypothesis development. In section4, we use the sample of transaction undeveloped land in the residential district of Zwierzyniec in Krakow.

2. Theoretical background and previous research

In the paper, we analyze joint effects of potential density of development and risk connected to obtaining development permits on land prices. The topic has been addressed in the literature – both theoretically and empirically. As Evans (2004, p. 76) suggests, discussion on theoretical relations between planning and land values can be traced back to David Ricardo and his *Principles of Political Economy and Taxation* published in 1815.

One branch of empirical research focused on the relation between land price and land use, and addressed the problem of elasticity of substitution of land for capital. While economists tried to estimate the production function of housing since the 1960s (Arnott and Lewis, 1979; McDonald and Bowman, 1979; Muth, 1964), the discussion is far from completed, as new measures of elasticity of substitution were introduced (Epple et al., 2010). Another branch of theoretical discussion about the relationship between urban density, land values, and development decisions dates as early as the 1970s (Anas, 1978), and it has been continued since (Capozza and Helsley, 1989; Jou and Lee, 2015).

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Several studies addressed the problem of optimal development density (Kono and Joshi, 2012), also in presence of externalities from new development (Lee and Jou, 2007).

Urban density is prone to a substantial measurement problem (both in terms of validity and reliability) and can be considered “a rather fuzzy and highly complex concept” (Krehl et al., 2016). Nevertheless, some urban density indicators are more popular than others, one of them being Floor Area Ratio (FAR) – a relation between the total area of all floors above ground measured based on the external outline of the building and the total plot area. It was used as a measure of urban spatial structure in several research papers. For example, FAR was used to track the changes within New York City from 1890 to 2009, to reveal that the city has maintained its monocentric density pattern (Barr and Cohen, 2014). Similar research indicated that monocentric model does not necessarily apply to all cities, as evidence from China (Cao et al., 2016) and Germany (Krehl et al., 2016) suggest. Additionally, cities can exhibit significant local variation with respect to FAR, a complex result of their past urban development, turbulent history, and current zoning and development restrictions.

Several economic studies analyzed what is the influence of zoning on housing supply, and market prices at the municipal level. Effects of land use regulation were subject to both theoretical and empirical scrutiny (Cheung et al., 2009; Glaeser and Gyourko, 2003). US-based evidence suggests that zoning can have both direct and indirect effects on various economic and social outcomes. There is significant evidence that land use regulations have a direct impact on the housing market (Sunding and Swoboda, 2010). In another study, Kok et al. (Kok et al., 2014) found that there is a positive correlation between strict land use regulation and property prices. In particular, they observed that municipalities with more rigorous procedures to obtain a building permit or a zoning change have higher land and house prices (Kok et al., 2014). Additionally, land use regulation can have profound segregation effects within local housing markets, affecting demographic characteristics within particular neighborhoods (Quigley et al., 2004). Results of another study in Philadelphia suggests that building permit policy may cause price distortions in land markets (Asabere and Huffman, 2001).

Intra-urban differences in planning rules may lead to other consequences. Newburn and Ferris (Newburn and Ferris, 2016) study indicate that although downzoning does not significantly alter the probability of development, it does strongly affect the density of development. On the other hand, a recent simulation-based study in the US, revealed that intensive zoning can result in a reallocation of development (Zipp et al., 2017). We can suspect that one market consequence will be an increase in demand for unprotected land (not covered by conservative zoning plans). As the result, significant price premium could be observed for all land not subject to restrictive protection.

An interesting study, based on hedonic approach, was conducted in Japan. Based on transaction data from Tokyo, Gao et al. (2006) examined how maximum allowable development density imposed on land parcels (measured as Floor Area Ratio) influences land prices, to find that the effect is nonlinear (plots with medium FAR, ranging from 1.1 to 1.7 being the most expensive). The result must be treated with caution, as the estimates could be influenced by location-based externalities (plots with highest FAR, being located in areas with comparably less attractive landscape). In general, we can suspect that increase in maximum allowable development density should result in a nonlinear increase in land value (marginal profits diminishing with the size of development) (Fig. 1).

An interesting branch of economic discussion on the relations between development potential and land values stems from real options theory. The examples of recent empirical papers using real options theory in the context of land development include: (Bulan et al., 2009), Grovenstein et al. (2011); Yao and Pretorius (2014); D’Alpaos and Marella (2014). In the extensive review of the application of real options in the context of land development and redevelopment (Womack,

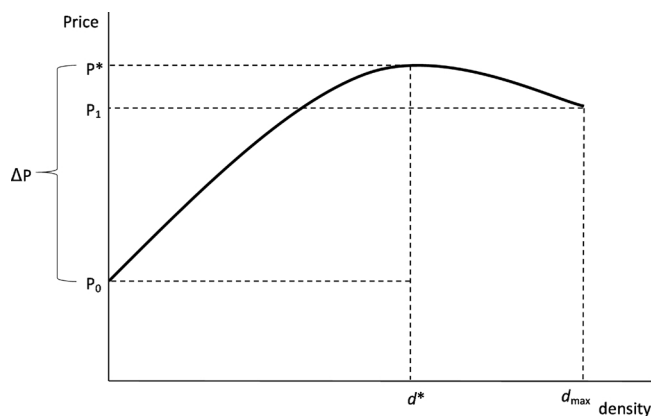


Fig. 1. Theoretical relations between density of potential development and land price. Source: own elaboration

2015) suggests the approach can significantly improve understanding of land markets. The main reasons can be summarized as follows: (1) land development is irreversible and subject to uncertainty, yet (2) land ownership is associated with a certain degree of flexibility regarding the major parameters of the investment project. This optionality enables the landowner to adjust the timing and scope of the investment accordingly to the changing conditions on a market, thus it presents real value from an investment perspective. One of the major issues with real options is that in practice owner decisions are restricted by planning and building permissions. One could argue that options related to development project timing – specifically initiation and delay options – can be reasonably exercised only in the situation when the investor has a valid building permit. Moreover, several options related to development size and scope can only be applied within the boundaries set by land use and density – described explicitly in zoning plan or planning decisions. We argue that in other cases the real option concept can easily be misrepresented.

There are few papers discussing the influence of planning on development decisions (Krajewska et al., 2014) in Poland. Recently, Foryś and Putek (Foryś and Putek, 2015) analyzed the impact on planning decisions on land value, and Zygmunt and Gluszak (Zygmunt and Gluszak, 2015) argued that development potential significantly influenced land values. Any of this studies addressed explicitly the role of the differences between planning decisions and density of development.

3. Data and methods

3.1. Origins of the problem and hypothesis development

Land use regulations and specific development principles in Poland are a core competence of local government, which has an authority to introduce local zoning plans (LZPs), and issues planning and building permissions.

In fact, it is a mixed system. As a principle, planning at the local level is based on LZPs, covering selected areas of a municipality. LZP regulates permissible land use, the density of development, allowable building height, minimum lot size, historic preservation. Adopting LZPs is recommended but not obligatory.

In case the LZP for a specific area is not adopted, the more discretionary approach is utilized, based on planning decisions issued by the municipality. In particular case land use is resolved individually after an interested party (potential investor) files a petition for an administrative decision on building condition (Decyzja o warunkach zabudowy i zagospodarowania terenu). A decision on building condition (DBC), can be treated as a substitute for LZPs regulations, as it regulates land use and development conditions (in a similar way as it is done in LZPs).

To conclude, based both on LZP or DBC regulations potential

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