



Research paper

Greenbelts in Germany's regional plans—An effective growth management policy?

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HIGHLIGHTS

- First detailed review of the performance of greenbelt planning in Germany.
- Use of geo-referenced data on the geography of greenbelt planning.
- GIS-based empirical evidence on the output and outcome of greenbelt planning.
- Contribution to cross-national comparative studies on growth management policies.

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ABSTRACT

Greenbelts are the best-known growth management policies in Germany. As part of its regional plans, they attempt to keep undeveloped areas permanently open, thus avoiding sprawling, i.e., land consumptive forms of urban development. However, the effectiveness of such land use designations in terms of guiding and limiting urban growth has rarely been the subject of in-depth research. This is the first study to present a GIS-based analysis of the restrictiveness of greenbelt designations in Germany and their impact on urban spatial structure and land use. The key question is to what extent greenbelts actually limit urban growth, both individually and in combination with other policy instruments of open space conservation. Key indicators are the tightness of greenbelts around urban areas and their effect on the regional patterns of urban growth, measured by the increase of built-up areas in contained (the inbound area) and uncontained (outside the greenbelt) communities. Our empirical results for four case study regions suggest that greenbelts are an effective means of open space preservation. The impact of greenbelts on spatial urban structure, however, seems to be limited due to a relatively low degree of tightness.

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1. Introduction

Germany has a relatively strong tradition of urban growth management and greenbelt planning at both regional and local levels of implementation. During the 1960s and 1970s, planning regions began adopting greenbelt policies in direct response to urban growth pressures and urban sprawl. An early example is the Regional Plan for the Ruhr Area from 1966 (*Siedlungsverband Ruhrkohlenbezirk, 1967*), which included a system of north–south green corridors that aimed to prevent neighboring towns from merging into one another. Much earlier, cities such as Berlin (*Senatsverwaltung für Stadtentwicklung, 2002*) and Cologne (*Schumacher, 1923*) established greenbelts and green corridors

(also referred to as “greenways”) in their land use plans to control and direct urban growth. Today, greenbelts are among the best-known regional planning policies in Germany. Approximately 60% of Germany's planning regions have implemented greenbelts in their development plans in combination with other policies of urban growth management (*Domhardt et al., 2006; Finke, Reinkober, Siedentop, & Strotkemper, 1993*).

In line with planning practices around the world, the main aim of German greenbelt planning is to prevent urban sprawl by keeping undeveloped areas permanently open (*OECD, 2012*). Greenbelts are a continuous expanse of open space that surrounds urbanized areas of mostly metropolitan regions (*Gennaio, Hersperger, & Bürgi, 2009*). With a view to their spatial shape, greenbelts can be distinguished from greenways (*Fábos, 2004; Gobster & Westphal, 2004; Ahern, 1995*) which aim at protecting linear landscape elements such as river corridors. Being an integral part of a binding regional plan, greenbelts establish a permanent spatial barrier to urban

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expansion by means of planning controls (Bengston & Youn, 2006). The construction of new buildings is prohibited in the greenbelt unless it is for purposes of agriculture, forestry or special recreation and leisure activities. Similar to other countries (e.g., South Korea), landowners have not been compensated for a loss of their development rights caused by a greenbelt designation (see also Bengston & Youn, 2006; Kühn, 2003). Due to these direct constraints on development, greenbelts are considered one of the most restrictive policy instruments of urban containment.

However, very few studies have addressed the efficacy of greenbelts as a growth management policy in Germany. Evaluation has not kept pace with implementation, as Carruthers noted for North America (Carruthers, 2002a). Little is known about the actual effects of greenbelts on the intensity and pattern of urban growth (Woo & Guldmann, 2011). The debate on both the desired and the unintended effects of growth management clearly suffers from the absence of empirical facts about the implementation of greenbelt designations and their spatial outcomes. Although proponents view greenbelts as an essential tool of compact urban development, critics argue that this type of restrictive planning could generate a distorted land use pattern, resulting in rising land prices in core cities and leapfrog development outside the contained metropolitan core (see Section 2 for a review of empirical research).

The main question to be answered in this paper is whether greenbelts fulfill their intended objectives, namely, the containment of urbanized areas and the protection of valuable open space. We ask whether there is a significant quantitative influence on the intensity and pattern of urban growth, and we argue that such an effect can be expected when greenbelts have tight geographical coverage. Tightness refers to the amount of potentially developable land that remains between the already urbanized parts of the region and the greenbelt (also called the inbound area).

In this context, two sets of questions are of particular interest:

- How restrictive is the implementation of greenbelts, given their territorial coverage and tightness? How much do regional greenbelt approaches vary in terms of the geographical area covered?
- To what extent do greenbelt designations restrict the intensity and location of growth? How effective are they in containing urban growth? Do they displace growth from more to less restrictive communities?

The remainder of the paper is organized as follows. After briefly reviewing the available international literature on the efficacy and impact of growth management (Section 2), we explain the practice of greenbelt planning in Germany (Section 3). This section includes a short description of the German spatial planning system and a discussion of the most important growth management policies. In Section 4, we introduce the methodological approach and define key terms. Section 5 presents the empirical results from four German planning regions followed by our conclusions and summary (Section 6).

2. Literature review

As countries and regions increasingly adopt growth management policies, the debate over their efficacy and their effects on urban spatial structure and land markets has intensified significantly over the last 20 years. Many studies have addressed the US experience with statewide and local growth management programs (Carruthers, 2002a, 2002b; Dawkins & Nelson, 2002; Dempsey & Platinga, 2013; Jun, 2004; Landis, 2006; Nelson, 1999; Paulsen, 2013; Pendall, Martin, & Fulton, 2002; Wassmer, 2006; Woo & Guldmann, 2011). However, empirical research has also been conducted in Europe (Amati & Yokohari, 2006; Bizer, Einig,

Köck, & Siedentop, 2011; Bramley & Watkins, 2014; Campaign to Protect Rural England & Natural England, 2010; Couch & Karecha, 2006; Dielemann, Dijst, & Split, 1999; Evers, Ben-Zadok, & Faludi, 2000; Fina & Siedentop, 2009; Gennaio et al., 2009; Kühn, 2003) and Asia (Bae, 1998; Bae & Jun, 2003; Bengston & Youn, 2006; Lee, 1999; Tang, Wong, & Lee, 2007; Yang & Jinxiang, 2007). Some results confirm the general efficacy of urban containment policies; growth boundaries and greenbelts result in a spatial concentration of development in core cities and higher densities (Amati & Yokohari, 2006; Campaign to Protect Rural England & Natural England, 2010; Gennaio et al., 2009; Nelson, 1999; Nelson & Sanchez, 2005; Wassmer, 2006; Woo & Guldmann, 2011). Urban growth boundaries and greenbelts therefore appear to fulfill their main objective: they support the reuse of derelict areas and infill development in already urbanized areas. By protecting valuable open space (e.g., prime farmland or environmentally sensitive areas) and ecosystem functions, growth control policies yield clear benefits for society (Bengston & Youn, 2006; Campaign to Protect Rural England & Natural England, 2010; Nelson, 1999). Higher densities of development increase the efficiency of urban land, with lower per capita costs of providing people with urban services (Carruthers & Ulfarsson, 2003; Hortas-Rico & Solé-Ollé, 2010).

In other respects, growth management remains highly controversial. Some studies point to risks of “leapfrogging” effects when urban growth occurs in areas beyond the contained zone. Moreover, land price effects have raised concerns about the unintended social outcomes of strong growth controls. Researchers have found evidence of significant land price effects of strong growth management regimes as the land supply in contained areas is constrained (Dawkins & Nelson, 2002; Pendall et al., 2002). Increasing land and house prices could have negative implications on the housing supply, especially for low-income groups. For the Netherlands, Korthals Altes found that a lack of land supply, which was an outcome of growth management, reduced overall housing production (Korthals Altes, 2006). One reason could be that developers do not automatically respond to rising land prices with density increases (Dawkins & Nelson, 2002).

Other studies have found proof of a spatial shift of development beyond the contained area. This finding especially applies to local growth management programs that do not have control over development in adjacent jurisdictions (Bae & Jun, 2003; Jun, 2004; Nelson & Sanchez, 2005; Ogura, 2010; Pendall, 1999). Carruthers notes that growth management is barely effective in politically fragmented landscapes, where a lack of cooperation among local jurisdictions produces “a ‘porous’ land market where land developers and households are able to seek out areas that remain comparatively free from regulation” (Carruthers, 2002a, p. 393). Such spillover effects might have negative implications on commuting patterns, public service costs and environmental resources due to the dispersed and scattered nature of urban growth. In some countries, however, the “leapfrogging” of development must be seen as an essential part of containment strategies. For example, the South Korean government intended to reduce inter-regional disparities with the establishment of the Seoul greenbelt in the early 1970s (Bae, 1998; Pendall et al., 2002).

Dawkins and Nelson (2002) and Pendall (1999) note that the (potentially negative) effects of growth management depend not only on the nature of the policies but also on the means of their implementation. Massive housing price inflations are more likely when growth boundaries and greenbelts are drawn tightly around an already urbanized area. A flexible, properly managed growth control that leaves sufficient development reserves inside the contained zone and does not restrict urban growth could prevent negative market reactions (Bengston & Youn, 2006). Moreover, the analysis by Dawkins and Nelson supports the conclusion that demand-side factors (e.g., income growth) might be more relevant

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