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Green Online vs Green Offline preferences on local public goods trade-offs and house prices

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ABSTRACT

This paper focuses on the relationship between (i) house prices and (ii) local green public goods. The main objective of the paper is to analyse a specific house-pricing mechanism which reflects the utility of being Green Offline, i.e. having access to green areas, versus the utility derived from the ability to be Green Online. The focus will be on data from European Union countries, and in particular Germany. Our results show that on an aggregate level for the EU there appears to be a clear indication for an irrational house-pricing mechanism, ignoring the negative trade-off effect from Green Online and Green Offline public investments (goods and assets). Meanwhile, on an individual level, for the case of Germany, more detailed bounded rationality effects of fashion-driven supply on house pricing are observed, positively related to Green Online values but negatively related to high Green Offline preferences. In conclusion, we find that house prices throughout Europe do not reflect a rational social change in green preferences, but tend to irrationally overprice Green Online values, which may create instability on the local housing market in the long run.

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1. Introduction

Where people prefer to live is reflected in the monetary and non-monetary (e.g. cultural) value that they attribute to their habitat. To understand this valuation mechanism, we need to design first an appropriate house-pricing model that focuses on the value of houses in cities (as opposed to rural areas), since cities are the geographical magnets for the world today. Secondly, a house-pricing model should capture a meaningful set of needs and attitudes towards the socio-economic activity of the city from which people derive their utility.

An appropriate house-pricing model should, therefore, include both the economic and the social aspects of living in a certain place, including the opportunities offered by digital technology. Clearly, the pricing should reflect the relationship to both: (i) economic fundamentals such as: the overall productivity of the place, income, transportation/accessibility, etc.; and (ii) socially-relevant aspects such as the particular mix of cultural amenities (as claimed by, amongst others [23]), public goods (such as quality of, and access to, education; see, for example Ref. [26,67]), and common assets (such as green spaces; see, for example Ref. [37,69,55]). While cultural amenities and public goods are widely studied in recent research, the notion of green values is more included in the dialogue on clean air and emissions (see, for example Ref. [19]) than in the context of a leisure and socialization-related public good. The original meaning of the 'need for green' as a social arena, a place for interaction and derivation of social communication utility (as advocated by, for example Ref. [37]), is basically absent in the modern economic analysis dealing with house-pricing models. The present paper attempts to offer an exploration in this 'green area' domain of utility. Moreover, we regard green values in the context

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of a modern smart city as the particular focus of the spatial level of interest. Here, we follow Caragliu et al.'s [14] definition of a smart city: "We believe a city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and high quality of life, with a wise management of natural resources, through participatory governance." This means that, in a post-Jacobian society, the sidewalks are gradually competing with another socialization-related public space – the digital 'online' environment and its networks. Therefore, we aim to align the Jane Jacob's approach to the changing nature of human interaction and the role of online social networks in a city (see Ref. [8] on the changing nature of social relationships). In our study, an internal rational trade-off between social interaction as a public good provided through the availability of either common assets such as green spaces or of access to socializing while being 'green-online' through Internet services is assumed.[1]

It is noteworthy that not only the inputs in a house price model, but also the way they interrelate in shaping the price are somewhat unclear in most price formation models. Rational expectation suggests that price as a main tool of supply and demand goes up when there is a higher utility derived from and a higher preference for a certain option for choice. Alternatively, if bounded rationality is taken into account with the same level of preferences for two options, one of them gets much higher priced than the other. This is usually referred to as a 'bubble effect'. The domain of investment in public goods has long been known to be irrationally culturally-biased, creating local cultural relativity-driven disparity in public goods provision (see Refs. [6,9,72,52,11]). That is why the latter is a particularly relevant field for exploring the bounded rationality effect on house pricing, as public assets (such as parks and other green areas) and public goods (such as policy-provided services in education, health etc.). Their pricing is less driven by a profit maximizing rationale and more likely to be shaped by local cultural beliefs. A powerful line of thought has developed over the past decades, which suggests the use of a learning model with a Bayesian trial and error rule, sometimes called a model of 'near-rationality' behaviour of price formation. This Bayesian model expresses how beliefs bias the choice, but prices slowly adapt to their real rational value by a gradual adjustment of the hedonic level of the house price to its real level. This adjustment is a highly interesting and exciting departure (see Refs. [1,25]). However, even this advanced approach to house pricing fails to account convincingly for the actual behaviour of the data, as the original authors of this model admit themselves. The proposition of the current paper is that this shortcoming may be due to: (i) a biased assumption with regard to the Bayesian rule behind the learning model and (ii) the vagueness of the definition about what is a true price level for a house if not the hedonic valuation of its economic and public good associated characteristics. Instead, a rational dependence between the irrational locally-specific preferences for public goods provision seems to be plausible here. This rational dependence shapes a rule which precisely regulates the deviations from the fundamental economic price expectation based on a proportional change in house price in relation to the change of culture and fashion preferences over time.

In the current paper, we aim to examine this novel rational cultural trade-off rule for the level of the belief-driven uncertainty in house price formation in a smart city and on a micro-economic level. We relate our operationalization of this hypothesis to what is the least researched – and highly cultural-belief-sensitive – 'need for green'. This need for green can be translated as a need for socialization in a public environment (real or virtual). Yet, clearly, socialization is a form of self-actualization needs in Maslow's pyramid, in addition to and above the need for economic fundamentals of house price formation. Therefore, in addition to cultural preferences we include economic explanatory variables in our house-pricing model. Moreover, we choose to undertake a – relatively underinvestigated, at least from a house-pricing perspective – case-study of the European urban house-market (EU and Germany, specifically).

The structure of the paper is as follows. Section 2 briefly surveys the relevant literature and the main principles of the cultural gravity rule behind our proposed mechanism of choice for house prices. Section 3 lays down the empirical operationalization of the cultural gravity model for EU cities, from the perspective of the modern context of the existence of social networks and digital online socialization, in addition to Jane Jacobs' melting pot concept from the 1960s. Next, Section 4 presents the data used, the estimation strategy, and our empirical findings. Section 5 concludes.

2. The cultural gravity of the public goods trade-off

In this section, we will the critically review the learning model mechanism where through a trial and error rule the expectations and uncertainties of beliefs about a price adjust to a particular optimal price. Adam et al. [1] suggest the following general household utility maximizing model:

$$E^{P}{}_{0}\sum_{t=0}\delta^{t}(\xi_{t}h_{t}+c_{t}), \tag{1}$$

where $c_t \geq 0$ denotes consumption of goods, $h_t \geq 0$ consumption of housing services, $\delta \in (0,1)$ the time discount factor, and $\xi t > 0$ a housing preference shock (for a recent theoretical work on shocks and productivity, see Ref. [7]).

The underslying assumption of this model is that preference shocks evolve according to the following 'near-rationality' learning model type of dependence:

$$\ln\xi_{t} = \ln\xi_{t-1} + \ln\varepsilon_{t}, \tag{2}$$

where ε_t is an iid-distributed innovation, satisfying $E[\ln \varepsilon_t] = 0$ and $E[(\ln \varepsilon_t)^2] = \sigma^2{}_{\varepsilon}$; and ξ_t is the preference shock, which captures changes in the population's preferences for housing services relative to consumption.

The analysis in the present study, instead, introduces the proposition of an exogenous belief mechanism that adjusts to its equilibrium (for more details on hedonic equilibrium alternatives, see Ref. [49]), and determines prices through local taste preference optimization. This exogenous belief mechanism is assumed to be rational, i.e. appropriately reflecting in house prices the actual change in preferences.

In addition, people's preferences in a locality tend to have a 'mean' level, which the culture-based development (CBD) paradigm understands as local cultural values [59]. These local cultural values bias rational choice, especially with regard to local public goods and public assets provision. This is the reason for disparities in the provision of local public goods and assets, in addition to formal economic factors [72]. Our proposition is that the rational mechanism of trading-off between values reflects – through supply and demand – this cultural change expressed as a change in price.

[1] We can think of the pre-digital and digital era as the Jacobian and neo-Jacobian time divide referred to here as a generalized time divide (as defined by the Culture-Based Development (CBD) concept) which distinguishes cultural heritage and living culture as the two sides of local cultural capital (for details, see Refs. [59,60,64,65].) that is why Green Offline is considered cultural heritage related while Green Online is considered as the living culture of socialization nowadays.

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