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Urban landscape in relation to building cycles and bid-rent curves.

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Abstract

Conzen (1960) mentions that fringe belts may form when city growth is halted. Whitehand (1972) uses bid-rent curve analysis to show that different types of development take place beyond the current city edge during building cycle upswings than during downturns. He divided Glasgow into belts of fixed width and derived the proportion of the area at each distance where new development for houses and institutions took place. The study period was split into several sub-periods, each conforming to a particular boom or slump in the housing market. Whitehand found that the development of Glasgow did largely follow the predictions of the bid-rent theory. This theory is tested in Reykjavík, Iceland. As the city of Reykjavík expands from its core on a peninsula towards the mainland, the centre of growth of new building and development moves ever further away from the city centre. Although economic fluctuations appear to be echoed in the building cycle, periods of economic downturn at most slow down the rate of the expansion of Reykjavík (Kristjánsdóttir 2007). This paper expands on previous studies by adding twenty years of data covering turbulent times in the global and local economies, showing a stronger coherence with predictions of the bid-rent theory than previously recorded. In the wake of the global financial crisis the economy experienced its first housing slump since immediately following the Great Depression. This gives an opportunity to revisit the application of bid-rent theory and housing slumps in explaining the relative share of residential housing in new developments. Here this is done by looking at time series for the volume of housing construction.

Keyword: *bid-rent curves, building-cycles, fringe belt, economic downturns, Reykjavík,*

Introduction

In his study of Alnwick Conzen (1960) mentions that fringe belts may form when city growth is halted due to physical or economic conditions. This idea was expanded on by Whitehand (1972b) where he discussed the potential of applying time series analysis in geography and the implications of economic concepts for explaining certain aspects of the development of urban land-use patterns. Whitehand (1972a) studied the formation of fringe belts in Glasgow in relation to building cycles. He derived a model explaining the process of converting land from rural to urban use, focussing on the residential and institutional components in the urban land-use pattern. Whitehand postulated the bid-rent curves (figure 1) which show that during housing booms the proportion of development of new houses to new institutions is higher than during housing slumps. This proportion falls with distance outward from the city's edge. During housing slumps development for institutional use takes place at the edge of the city with very little new housing development. Belts of

institutional development thus form in the urban fabric during housing slumps. The pattern emerging during housing booms is more complex. New housing development takes place with preference to the proximity to the city centre. New houses therefore are denser closest to the city's edge during its expansion, while institutions are scattered in between and, in particular, further away.

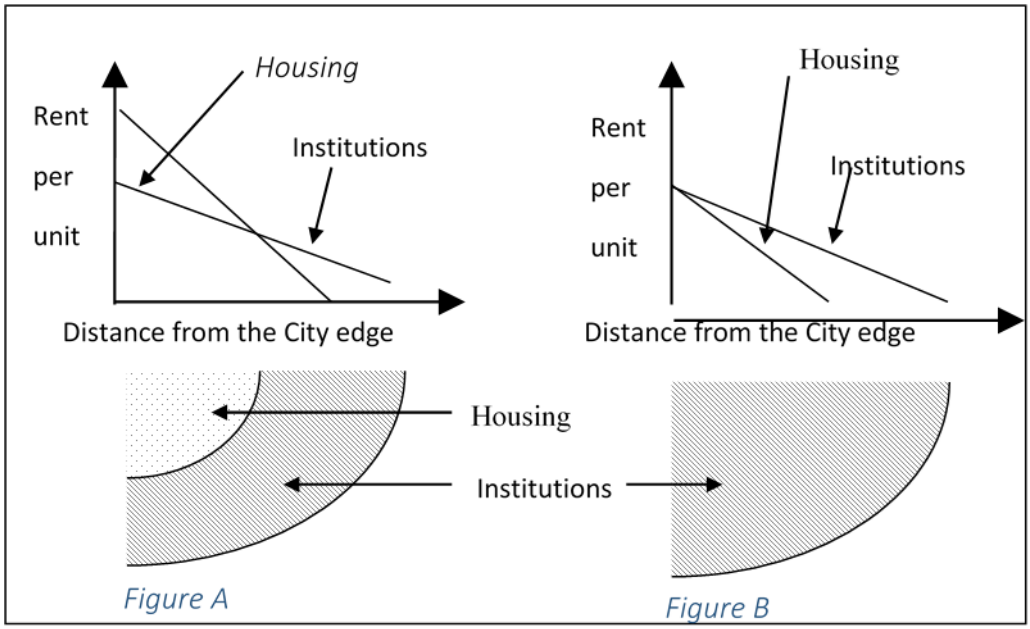

Figure 1. *Hypothetical bid-rent curves and resulting land uses, (A) during an economic boom, (B) during an economic slump (Whitehand 1972b p. 216).*

Whitehand (1972a) shows that different types of development take place beyond the current city edge during building cycle upswings than during downturns. He finds that the demand for land for residential construction is more dependent on economic conditions than the demand for land for other types of construction. When the housing market is booming the land beyond the city's edge is more valuable for residential construction as the prices of houses have gone up. When the economy experiences a building cycle downturn the value of new residential buildings goes down and does so faster than the value of other kinds of buildings, and therefore the land will rather be used as a site for constructing non-residential buildings. Whitehand (1972a) divided Glasgow into belts of fixed width and derived the proportion of the area at each distance where new development for houses and institutions took place. The study period was split into several sub-periods, each conforming to a particular boom or slump in the housing market. Whitehand found that the development of Glasgow did largely follow the predictions of the bid-rent theory. This can then be used as a criterion for locating fringe belts as demonstrated by Whitehand (1972a).

The timing of building cycle downturns in Reykjavík, Iceland is analysed in this paper and related to the relative development of residential and other types of buildings. The following section discusses investment data from annual reports of the office of planning in Reykjavík to identify building cycle downturns. This is

followed by a comparison between building-cycles and economic downturns in Iceland that might cast light on the growth of Reykjavík during the past century. Data for the most recent period suggests that the first real housing slump in Reykjavík, perhaps since the Great Depression, occurred following the global financial crisis of 2008. Outline of further research is laid out in the concluding section.

Construction data for Reykjavík

Reykjavík's growth is far from that of a circular city. Its old core is located on a narrow patch between a lake and the shore, out on a peninsula. Its subsequent growth is mostly directed inwards, from the peninsula and into the mainland. Initially the buildings were denser along the main roads leading into the original site. Later the areas in between were also largely built up, although the time of their development depended on the physical features of the place in combination with the current available building technology. This is in accordance with Whitehand's findings on the contribution of physical features of the landscape for the development of the urban form. Although development has roughly followed a path from the city's core on the peninsula and inward to the east, it has also taken some detours, depending on the physical landscape and the level of construction technology. However, focussing on a time series for the volume of construction allows a direct comparison between the amount of residential development as well as the relative share of other than residential housing.

The annual reports of the department of the Director of Planning and Building in Reykjavík contain data on new residential buildings in Reykjavík from 1929 onwards. The reports vary in the data collected and the descriptions given of the data. The only data series in the reports that is consistently reported throughout the period from 1929 onwards is the volume of new residential building in terms of cubic metres. This measure takes no account of the quality of housing, changes in the composition of apartment buildings and single-family housing, and changes in the amount of space per person. However, for the purpose of identifying when there are downturns and when there are growth periods in the residential housing sector, these data are adequate. Thus, building-cycles are identified from data on the volume of new housing built in Reykjavík.

Following Whitehand (1972a) we define housing slumps as severe contractions in building, where development of new housing grinds to a halt. Two such periods can be identified from the data on cubic metres of residential construction. First right after the beginning of the series, in the years 1931 to 1944 (except for 1943 but only by a small margin), construction of residential housing falls below half its average value for the entire period. During 1931 to 1944 the average for the series is 70,837 compared to the average of 202,909 for the entire periods from 1929 to 2020. The next time the series dips below half the average is in 2009 to 2013 (except for 2010 when it is slightly above the criteria). During 2009 to 2013 the average number of cubic metres of residential housing built in Reykjavík is 80,136.

The building cycle is at a peak at the beginning of the data series in 1929, but it soon slows down. In fact during each of the 12 years from 1931 to 1942 the volume of new residential buildings in Reykjavík was lower than in any year for the remainder of the twentieth century. At this time unemployment in Reykjavík was very high, probably close to 20%, largely due to migration from the country side. Prices had been falling after the First World War and real interest rates on bank loans were still above 20% in 1931 (Snævarr 1993). This period of housing slump in Reykjavík can therefore be directly linked to the economic effects of the war and coincides also with the Great Depression.

The period after the slump of the 1930s and the early 1940s and until the financial crisis of 2008 can be characterised as a period of a building cycle boom, with the average volume at 237,013 m3 per year, although in the 1990s volumes of residential buildings fell to half the highest levels reached in the 1980s. The series starts at about the time that Reykjavík begins to expand beyond the ring-road. In the first half of the period there were long swings in the series of about 12 to 15 years duration while from the late 1950s until 1985 there were larger and more frequent fluctuations, but around a much higher level than before. From around 1985 there was a relative slowdown of growth again although the period cannot be identified as a building cycle slump by any reasonable criterion.

The second housing slump appears following the global financial crisis of 2008. In the build up to the crisis economic conditions for housing development had been exceptionally favourable. A new expansionary period had followed a change in the form of government subsidised housing loans to the public, enacted in 2004, which resulted in lower interest rates on housing debt than before. This boosted the market price of housing, driving it far above the building cost, and resulted in rapid expansion in housing investment during 2005 to 2007 (Elíasson and Pétursson 2009).

Refinancing without the sale of the property was virtually impossible in Iceland until August 2004. Prior to that government financed mortgages were the dominant method of financing. A sale was a necessary condition for new loans to be issued and therefore refinancing required a change of home. In August 2004 the commercial banks offered mortgages for refinancing without a sale. At the same time interest rates on loans for the purchases of dwellings dropped, debt ratios increased and more people opted for longer loans. In addition foreign currency denominated mortgages became popular during the final year before the financial crisis which hit the fall of 2008 (Elíasson and Skúlason 2016). At that time the local currency lost over half its value, unemployment rose significantly, and real wages fell, and in some sectors nominal wages as well.

During the housing boom of 2005 to 2007 immigration played a significant role. A large fraction of construction workers immigrated to Iceland and particularly to Reykjavík, mostly from Eastern Europe. This also directly boosted demand for housing, driving prices further up (Elíasson 2017). In the wake of the financial crisis migration trend reversed and for the first time since 1879 the population of Iceland decreased

in 2009. Due to the combination of adverse economic conditions, severe financial conditions, and reversal in housing demand, the housing market came to an abrupt halt in 2010. This was the start of the first significant housing slump in Reykjavík since the 1930s and the first time since the Second World War that the housing volume index falls below half its average value for the entire study period.

From 2013 to 2018 economic growth resumed, driven by exports, and in particular be rapid growth in tourism. Immigration also resumed and at a faster rate than before, with foreign workers filling many positions in the tourism sector as well as in construction. This, combined with downward trending real interest rates and fast growing demand for short-term rentals by tourists put pressure on the housing market (Elíasson and Ragnarsson 2018). Pressure on prices was further increased due to a recently adopted policy by the City of Reykjavík to cease development of new neighbourhoods at the city's edge, despite the city's ownership of abundant land for further development. Instead the focus was put on densification, particularly of areas close to the old city centre. This had two effects. First, proportionately more of new residential development in the capital region than before happened in neighbouring municipalities. Second, the development that took place in Reykjavík happened within previously built areas and relatively close to the centre. This both slowed down the pace of new development as well as causing a rise in its cost.

In 2019 the economic growth started to slow and this was followed in early 2020 by the covid-19 pandemic. Although local restrictions were not as severe as in many other countries the tourism sector, which hand become the largest export sector, effectively closed down for months. The drop in employment, largely believed to be temporary, was met by aggressive expansionary policies by both the government and the Central Bank, which dropped its policy rate to 0.75% from 2.75% in early 2020, which was already its lowest rate on record. Hench, in 2020 there was a serious boom in the housing market despite the severe negative shock to the economy.

The volume index, showing cubic metres of residential housing completed in Reykjavík, moves in line with the volume index for residential housing investment (Kristjánsdóttir 2007). It shows a continuing upward trend following a slump from 1931 to 1945, with the next significant drop in investment in 2009 to 2014.

Non-residential building as a percentage of all building built (measured again in cubic metres) often moves inversely with investment in residential houses. This shows that when building of residential houses increases or decreases non-residential building is not as responsive (sometimes moving in the opposite direction).

From the same data sources as the volume index based on cubic metres of residential housing the ratio of non-residential housing to all building can be calculated. This shows that the relative volume of other than residential houses does fluctuate significantly and also that it shows an upward trend through most of the period. However, the ratio of non-residential housing rises relatively fast during the two identified housing slumps, while during the in between years it fluctuates in tandem with the smaller swings in residential

construction which appear to be governed by the general business cycle (Kristjánsdóttir 2007). This divergence of residential construction and the ratio of non-residential housing to total housing during the identified housing slumps is in accordance with Whitehand's (1972b) bid-rent theory although the current evidence is derived solely for economic time series.

Conclusions and discussions

There are only two periods in the time series for the volume of residential construction, first from 1931 to 1942, and again from 2010 to 2013, when the volume of new building falls under half its average level over the entire period. These can therefore be identified as housing slumps in the sense of Whitehand's (1972a) use of the term in his study of Glasgow. In both these periods while building of residential houses is falling the building of other types of housing does not fall as much. This gives support to the bid-rent theory (Whitehand 1972a,b).

Further study of these series, relating them to the actual location of buildings could shed further light on the formation of fringe belts in Reykjavík (Kristjánsdóttir 2007). A closer look at the series and its development in light of the general demographic development would also be a fruitful line for further study of this topic.omplete the paper with your conclusions.

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