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An unequal reaction of housing starts to house prices in different regions of Poland

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Abstract

In this article, we examine the developer's decisions regarding construction under process in relation to prices in the 16 voivodeship capital cities, i.e. the biggest real estate markets in Poland. Our aim is to determine whether developers react in a similar fashion in different voivodeship capital cities, or whether significant differences can be observed. The problem of housing availability is important for the mobility of workers and, therefore, is an important factor of sustainable regional development for Poland. We study the correlation of leads and lags of cycles in house prices in the primary and secondary market and wages with the cycles of new construction under way. We find that for the biggest markets there is a strong correlation between the lags of secondary housing market prices with construction under way. However, no clear pattern can be observed for the smaller markets, which calls for further research.

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1. Introduction

The housing market is extremely important to everyone because of the fact that it satisfies the need for shelter, but also because of the connections to the overall economy and the stability of the financial market. Most economic models treat the housing market together, i.e. the development market and the secondary market, while in the primary market the important issue is the decisions of developers regarding new supply and prices. There are also few empirical studies dealing with developers and examining their perceptions of the market situation (Lux, Sunega 2010). However, developers and investors play a key role in providing new supply, and in this article we focus on the reaction of developers to changes in prices. The housing market consists of the primary market, that is newly constructed housing, and the secondary housing market, that is housing from the existing housing stock. In economic reality, although there are arbitrage processes between these markets, they behave differently to some extent. The secondary housing market is a typical free-competitive market with atomistic agents, both on the supply and demand side. The developer market, on the other hand, is a typical monopolistic market, where the developer's monopoly power increases as the market size decreases (Łaszek, Olszewski, Waszczuk 2016). The individual nature of the transactions and the unequal position of the buyers versus the developers results in price differentiation and also classic monopolistic techniques such as cartel collusion, price leadership and supply management. In theoretical and empirically verified models, unfortunately, there is often an erroneous assumption that houses are produced by a competitive development sector (Piazzesi, Schneider 2016). On the positive side, it should be mentioned that developers customize the homes they build to the needs of the buyers, which improves the efficiency of their business by accelerating the time required to sell a house, as Kuświk et al. (2021) showed using the city of Opole as an example.

Intuitively and based on economic theory one would assume that developers increase supply when they observe price growth and curb it when they observe price declines. Many developers operate in multiple cities, so they can use their aggregate knowledge about the market and should behave in a similar fashion in each single city. However, when we look into single cities, this relationship is more complex, which needs to be explained. There are individual features of the cities which have an impact on the decisions of developers. Moreover, developers usually start the construction of new housing in large batches. This becomes especially visible in the smaller cities that have a shallow market. If we used classical methods of time series analysis at country level, e.g. calculated quarter-to--quarter increments, we would get very chaotic jumps in values up and down, which would be virtually impossible to interpret in a reasonable way. Moreover, such chaotic data would not be suitable for further econometric analysis. We, therefore, need to focus on the cyclical component of the time series, which takes into account the above-mentioned features of local markets. We extract it by applying the Christiano-Fitzgerald filter to our time series. Our analysis is mainly empirical, and we refer to Barras (2005), who presents a detailed theoretical model which explains why the cyclical component of housing construction is the most important element and why it needs to be studied.

We tackle the question how developers respond to cyclical price deviations in the primary market and in the secondary market, as well as wages. We ask what incentives developers respond to when they decide to start new construction, and with what delay they do so. In classical economic theory, the basis for such a decision is anticipated profit and rate of return, with the result that the decision is influenced by anticipated costs and price dynamics. In the residential real estate market, it's a little

different – the long construction process and the resulting cyclical nature of the sector must be taken into account, which results in certain shifts in time (leads and lags). Developers may react to similar stimuli in different regions with different lags, which may be due to their perception of the risk of being able to sell apartments in a given market.

The supply of an adequate number of housing units in a given market is an essential factor in facilitating labour mobility and the efficient allocation of human capital. This problem is being addressed in particular by the stream of new urban and regional growth economics, which combines traditional urban economics with elements of the growth theory (Glaeser 2000). Glaeser, Gyourko and Saks (2006) presented a model to understand the differences in inelasticity of supply of new housing in different cities, which helps to understand why in some cities the stock is growing, while in others growth is insufficient and demand generates price increases. Mach et al. (2023) analysed the numbers of newly constructed dwellings in Poland and found that it is significantly related to the average salary in the enterprise sector and the purchasing power. Moreover, they found that the housing market in Poland is characterized by poli-cyclity, which means that the main economic variables show cycles at various frequencies, namely monthly, semi-annual and annual cycles. It should also be noted that new construction increases the stock of housing, and this is an important factor in the wealth of households. Wroński (2022) shows that differences in the housing stock can explain the differences in wealth among CEE countries. The problem of housing supply in the market, especially regional supply, is relatively little understood in the literature especially in empirical studies. Different responses can be expected in the largest and most liquid markets as opposed to the markets of smaller cities. The Polish housing market is an interesting object of study in this regard, due to structural housing deficits and their dynamic production. Over the years, a very strong and efficient development sector has been created, which has already been subjected to two cycles, one triggered by a credit boom (foreign currency loans), and the other by low rates and the flight of deposits into the housing market.

We begin the study by analysing the relationship between cyclical deviations of prices from trend and the corresponding deviations of new housing construction in progress. Since this indicator is only available for the whole country, we propose a method on how to calculate it on publicly available data. We then analyse the correlation over time of this cyclical deviation of housing construction from cyclical deviations of income and prices in the primary and secondary markets. This approach gives us a fairly broad picture of the cyclicality and correlations of the most important determinants of new construction and the situation in the residential real estate market.

2. Literature review

The primary market and the influence of developers on the real estate market is still a topic that is relatively little studied, both theoretically and empirically. In his article, DiPasquale (1999) stressed the paucity of knowledge about housing supply and the development process. There is an emerging piece of literature on the supply side and the decisions of developers (Mayer, Somerville 1996; Somerville 1999; Ball 2008; Lux, Sunega 2010; Łaszek, Olszewski, Waszczuk 2016; Murphy 2018; Leung, Ng, Tang 2020), but still many gaps in our understanding persist to this day (Been, Ellen, O'Regan 2017).

The first thematic group of articles that must be analysed before proceeding to research the supply side of the housing market is research in the area of identifying how the housing market works.

It is extremely common in studies, especially macroeconomic studies, to assume that the developer market operates in the form of perfect competition or oligopoly, which is questioned (Wong, Monkkonen 2019). There are studies examining developer concentration and indicating that the market operates in an oligopolistic form (Leung, Ng, Tang 2020). Yet Glaeser and Gyourko (2018), and Glaeser, Gyourko and Saiz (2008) indicate that in the US, it is not easy to find a city where several developers dominate. In addition, Somerville (1999) suggests that home builders in the United States should be considered monopolistically competitive providers of differentiated products, where the size and concentration of developers vary in different MSAs. Łaszek, Olszewski and Waszczuk (2016), on the other hand, argue that the real estate development market functions as monopolistic competition and developers efficiently adjust production volumes and use a price differentiation mechanism to obtain windfall profits.

A highly concentrated market encourages uncompetitive behaviour, such as collusion, to maximize profits. There are other factors besides market power that can influence the average pricing of new housing construction and supply decisions (Lux, Sunega 2010; Wong, Monkkonen 2019). Capozza and Li (1994) develop a theoretical model of both optimal timing and optimal construction intensity. Developers, given the uncertainty of demand, often employ intertemporal sales strategies (e.g. selling in stages). In addition, some developers may set a high price and wait for buyers. This provides a difficult prospect for understanding patterns of over- or under-pricing and decisions regarding housing production volume. In this situation, the secondary market can serve as a self-regulating instrument to limit developers' market power. Whenever developers overprice their first-hand units, buyers can turn to the second-hand market. The presence of such a "threat" automatically forces developers to set a more competitive price, without government intervention. This means that governments should promote transparency (e.g. by increasing the availability of sales data) and liquidity in the secondary market to maintain a competitive primary market.

The real estate market can be analysed on a macroeconomic scale or regionally taking into account the nuances of each market. Housing supply delivered by developers can be explained by a multi-equation model, see for example Augustyniak et al. (2018). Their model consists of three equations: demand, supply and prices. The authors previously also included an additional equation for construction costs, but according to some studies, construction costs have little or no effect on the level of construction (Topel, Rosen 1988; DiPasquale, Wheaton 1994). This is most likely because developers shift those costs to the buyers. There are also studies where it was found that the dynamics of construction costs are not responsible for the increase in house prices either (Murphy 2018). To account for the locality of the market, panel analyses are also conducted. Such a study for Poland was conducted by Leszczyński and Olszewski (2017), and it was shown that prices depend on housing saturation per 1,000 residents, interest rates and income, as well as the unemployment rate. More recent studies on price behaviour consider whether prices in different markets converge to a single price level. Studies by Matysiak and Olszewski (2019), Tomal (2020, 2021) and Trojanek et al. (2023) found that different regional markets in Poland behave in different ways and that price convergence clubs can be determined. Interestingly, Rokicki and Hewings (2017) found for Poland's 16 NUTS2 regions that GDP per capita, which is deflated by local inflation, shows quite a strong convergence. House prices are strongly related to the local economy, so we should also observe convergence of regional house prices. However, the level of house prices depends not only on demand, but also on supply, which explains why the literature delineates three convergence clubs rather than just one. Matysiak et al. (2021) used panel

analysis on price convergence clubs to find determinants of new construction. They noted significant differences in the strength and significance of factors for different clubs. Their study suggests that these differences are due to the different responses of developers in different cities to similar factors.

Understanding housing supply is an important issue, as the length and severity of housing cycles, combined with the size of the construction industry, significantly affects the country's economy and financial stability. Analysing cycles allows us to gain greater insight into economic processes along two dimensions. First, the cyclical component is analysed to understand how much a given time series deviates from its trend. In the real estate market, price cycles (André 2010) or volume cycles (Leamer 2007, 2015) are usually analysed. A detailed review of studies of house price cycles can be found in Brzezicka (2021) and Łaszek et al. (2021). A more recent analysis of short- and long-term house prices using the Christiano-Fitzgerald filter, instead of the often-criticized Hodrick-Prescott filter, is presented by Łaszek et al. (2021). They show that this method can also be used for countries that have rather short time series.

The second branch of research concerns whether and with how many lags the cyclical component of one time series is related to another, i.e. cross-correlation of time series is studied. There is a rich empirical literature on the study of cross-correlation. Lamo et al. (2013) analyse the cross-correlation of consumption, wages and employment in the public sector in the euro area, while Reboredo, Rivera--Castro and Zebende (2014) analyse the cross-correlation between the USD exchange rate and oil prices. But this method is also used to analyse the relationship between human pressure on ecology and the population of fish in the North (Probst, Stelzenmüller, Fock 2012). There is a relatively smaller number of articles addressing the issue of cross-correlation of cyclical time series elements in the housing market (see for example Alvarez et al. 2010; Hui 2011; Bełej, Cellmer 2014; Cellmer, Bełej, Cichulska 2019; Liu et al. 2020).

3. Data and an initial inspection of cycles

We use quarterly data for the 16 largest regional housing markets in Poland and cover the period Q3 2006 – Q4 2020. The transaction prices per sqm of housing in the primary market (P) and secondary market (S) house prices as well as the interest rates are published by NBP (2022). Wages, construction costs and CPI as well as housing starts are published by Statistics Poland (2022). The house prices, wages and construction costs were deflated to exclude the inflationary trend. Moreover, the wage data were seasonally adjusted, while the house price data do not show signs of seasonality. Because the number of housing under construction is available only for Poland as a whole, we need to construct a proxy of housing under construction dynamics for each single city on the basis of construction starts. According to the analysis of Augustyniak et al. (2012) it takes 8 quarters to build a housing unit.[1] We take the moving average over this period as a proxy for housing units under construction in a given quarter.

The availability and feasibility of analysing other variables that determine supply and demand were also checked, i.e. interest rates and construction costs. However, interest rates are the same for

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[1] Here we consider only the factual construction process since the beginning of the construction start. The whole investment process is much longer, usually lasting up to 5 years. The developer has to acquire construction land and prepare it for the construction process and also needs to obtain the building permits. When those are signed, the developer can start the construction process immediately, but the start can be delayed by up to 10 years, if this is optimal for the developer, in the event that the market conditions change.

all cities, so they can help explain overall trends, but not deviations in individual markets. There is a similar problem with construction costs. Publicly available data covers the whole of Poland, while the costs provided by private advisory firms show rather similar behaviour over time, with relatively small differences in terms of price levels among the cities. Moreover, according to older studies, construction costs have little effect on the level of construction (Topel, Rosen 1988; DiPasquale, Wheaton 1994).

In the first step we apply the natural logarithm to all analysed time series. To improve the readability of the chart, we also present the index, where the mean for each time series is set as 1, on Figure 1. We observe for all the cities three important facts. House prices in the primary and secondary market behave in a similar fashion. They showed a strong increase in 2006 and 2007, then a drop due to the global financial crisis that lasted to around 2013/2014. From there, the house prices were on a rise again. Wages show continuous growth in Poland over the analysed period. The focal point of our analysis is that construction in progress shows a very differentiated picture across the cities and across time. In the larger cities we observe that the construction in progress moves similarly to the development of house prices. But for the smaller cities we get some mixed results. For example Olsztyn and Opole show very high increases in the initial periods, but this might be due to their very low construction in the initial years.

In the next step, we calculate the cyclical component with the help of the Christiano-Fitzgerald filter, as explained in Łaszek et al. (2021). We find that the cyclical component of the construction under way has larger amplitudes than the wages and house prices (see Figure 2). This is no surprise, as the latter series show long growth episodes, which are usually followed by rather long episodes of decline. In contrast, housing construction under way fluctuates more often.

4. Cross-correlation analysis methodology

We apply the cross-correlation analysis to determine whether a significant relationship exists between the cyclical component of house prices and the cyclical component of housing construction. According to Probst, Stelzenmüller and Fock (2012), four basic relationships can be found between two time series (unless we do not find any significant relationship): the first time-series leads the second one with a positive (or negative) sign or the first time-series lags the second one with a positive (or negative) sign. If no significant cross-correlation is found, the time series are completely unrelated. When we find a relationship, and we can make a reasonable hypothesis about the influence between the two series: we can say that the influencing time series can be called "input", while the influenced one "output". However, the cross-correlation outcome is no proof of causality – we need to make assumptions to be able to interpret the results. But we can confront our findings with common knowledge and our expert knowledge about the economy to verify whether the results are reasonable. We also need to remember that, as Dean and Dunsmuir (2016) point out, if two time-series show autocorrelation, the cross-correlation that we find can be completely spurious. They recommend to pre-whiten the time series if they are strongly autocorrelated. In the case of house prices and new construction, we know the data generating process from the literature, but also that the influence can go in both directions. When prices grow, developers can start to construct more to increase their profits. A higher supply can reduce prices. But on the other hand, developers can use monopolistic competition practices to increase their profits, i.e. restrict production to increase prices and make monopolistic or oligopolistic profits.

Therefore, we analyse house prices which they can directly influence (primary market) and also those prices which are much more competitive, i.e. the secondary market prices.

The sample cross-correlation between two pairs of data samples (in our case time series)[2] can be expressed as follows:

$$r_k\left(X, Y\right) = \frac{\sum\left(X_t - \overline{X}\right)\left(Y_{t-k} - \overline{Y}\right)}{\left[\sum\left(X_t - \overline{X}\right)^2\right]^{1/2}\left[\sum(Y_{t-k} - \overline{Y})^2\right]^{1/2}}$$

We consider lags and leads of X_{t+k} on Y. For negative n we analyse the correlation of lags of X with Y, for positive n we consider leads. If we find that there is a significant correlation for negative n, we say that X proceeds Y. In the case of positive n, X follows Y. We checked if calculated cross-correlations are statistically significant and considered only those values which in absolute terms exceed the threshold 1.96/ sqrt(n).

The cross correlation function is asymmetric. Beside the econometric explanation (Penny 2013), there is also a straightforward reason. For negative n, we fix our Y and move the X back in time. For positive n, we again hold the Y fixed, but now the X moves into the future. Unlike in natural science, we deal with endogeneity, so demand affects prices, but also prices affect demand. Economic theory tells us in which direction the causality should work. We know that developers will have additional incentives to start to produce more housing when house prices rise. Rising house prices can under given conditions increase demand, because housing is also an investment good and buyers expect further price increases. If we consider that one process can start faster than another, which is subject to various restrictions and has inertia in it, the cross-correlation results might differ significantly between the lags and leads. For example house prices might react fast to a mismatch in demand and supply. On the other hand, developers need to acquire land and permits before they can start new projects.

5. Empirical results

We present the results of the empirical analysis of the cross correlations on heat maps. This allows us to see the determined relationships between two time series for all cities at once. It should be pointed out that with the applied econometric framework we only analyse relationships and correlations in a statistical sense, but cannot determine causal relationships. For simplicity, we abbreviate the variables of interest in the following way: P – prices on primary market, S – prices on secondary market, NC – new construction (housing units), W – monthly wages.

The red colour indicates a strongly positive correlation, while the blue colour indicates a strong negative correlation. To improve the readability, we present correlation coefficients only for those correlations, which are statistically significant. We first analyse the cross-correlation between the house price cycle in the primary market and the construction in progress cycle. The heatmap (see Figure 3) shows that for the largest cities the house price cycle leads the construction cycle and the correlation is positive. It can be concluded that developers, after observing price deviations, change construction in

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[2] The time series need to be stationary for this method, but the cyclical component that we focus on is de-trended by construction.

progress in the same direction. Moreover, we also observe for this group of cities that the construction cycle leads the house prices cycle, but this time the correlation is negative. After construction in progress breaks out above the trend, the cyclical component of prices deviates downwards with some delay. It can be concluded that there is an economically justified relationship between price cyclicality and construction in progress.

However, since the prices and the number of flats under construction can be controlled by developers, to be sure, we analyse analogously the cross-correlations between the price cycle for the SM and the construction cycle. We obtain very similar results (see Figure 4). A recent analysis by Kokot (2022) shows that the prices on the primary and secondary market are closely connected, but they deviate at times. We therefore also analyse the cross-correlations of the cyclical price component in the primary and secondary market (Figure 5). We see a strong correlation of price deviations on the primary and secondary market. It can be seen that the cyclical components of prices in the two markets are intertwined, regardless of the size of the city. However, it can be noticed that in some cities the lag is longer than the lead and vice versa. One has to be careful with the interpretation of this result, but it may indicate that in some markets prices are secondary leads on the primary market, and in others they are primary market secondary leads. This observation requires further research.

We also analyse the cross-correlation between the cyclical component of wages and the cyclical component of construction in progress. We find significant differences among the cites, which can be summarized in two clubs. Mainly in the largest cities (and some smaller ones) a wage deviation from its trend leads a positive deviation of construction from its trend. Most likely developers who observe growing wages form positive expectations about housing demand and increase their supply. However, in the medium-sized cities we find a negative cross-correlation, which is difficult to explain. It seems that after some time a cyclical deviation of wages above the trend decreases construction in progress below its trend. Maybe the developers in the medium-sized cities do not look that much at the dynamics of wages and their cyclical component, therefore we do not find a reasonable relationship between those variables.

When we look at the correlations of income with prices, P and S, we see the opposite conclusion than we would expect. It turns out that the cyclical deviations of income are ahead of the cyclical deviations of prices, and the correlation between them is negative. Conversely, deviations in prices herald deviations in income in the same direction.

Regional data, unlike macroeconomic data, are less resistant to statistical errors related to their collection and processing. We paid special attention to the initial periods of the study, when the dynamics of the house prices and construction starts were high, which is confirmed by research (Łaszek, Olszewski, Augustyniak 2018; Łaszek et al. 2021), but we decided to conduct a sensitivity analysis. We therefore decided to conduct the study on time-limited data: from 2008 and from 2010 (see Appendix). The results were not significantly different from those obtained on the whole sample.

6. Discussions and conclusions

The aim of the research conducted on regional Polish real estate markets was to capture regional differences in developers' reactions to changes in factors.

For the largest markets, there is a strong positive correlation between the delays in home prices on the primary and secondary markets and the number of constructions. In smaller markets, which are less liquid and where demand is lower, such relationships are invisible. The construction cycle leads the house prices cycle, and the correlation is negative. There is a strong positive correlation between price deviations on the primary and secondary markets. It can be seen that the cyclical components of prices in the two markets are intertwined, regardless of the size of the city. In some cities, the lag is longer than the lead and vice versa, which may indicate "leadership" of the primary or secondary market.

Similar conclusions, as in the case of the cross-correlation of housing prices in the primary and secondary markets and the number of constructions can be drawn from the study of the cyclical component of wages and the construction in progress. In the largest cities, and surprisingly in two smaller ones, a wage deviation from its trend leads a positive deviation of construction from its trend. Developers observing growing wages anticipate increasing housing demand and expand supply. In contrast, in the smaller cities we find a negative cross-correlation. Probably the developers in the smaller cities are smaller family-companies and their situation is more uncertain. Large development companies with a large portfolio of projects can shift their means of production between projects and optimize risk.

However, the study of the correlation of income with prices, P and S, brings unexpected results. It turns out that while income cyclical variations outstrip price cyclical variations, the correlation between them is negative. Conversely, deviations in prices herald deviations in income in the same direction. The explanation for this phenomenon can be sought in the strong synchronization of the price cycle and the economic cycle. Żelazowski (2017) analysed those cycles for Poland, Germany, France, Ireland and the UK and found that they are highly synchronized. We are looking at the income cycle, but this is generally strongly synchronized with the GDP cycle, and therefore also with the price cycle. If we lead or lag synchronized cycles in relation of each other, we obtain uninformative results.

Cyclical deviations of construction start in individual quarters in individual cities are very volatile, which results from the fact that developers start construction in batches, and not in the form of a continuous process. One developer starts construction of a housing estate with 100, 200 or even 500 apartments at a time. At the same time, the process of price changes is continuous. Therefore, the initial analysis on raw data did not allow to find the determinants of starting construction by developers. This measurement and statistical problem has been solved by proposing an indicator of the dynamics of production in progress, calculated as the dynamics of the average of commenced constructions in the last 8 quarters.

An understanding of the correlations between the main determinants of housing construction is important for housing policymakers, as in many cases new supply helps to satisfy the increasing housing demand and can mitigate the impact of house price increases. In those cities, in which developers start new construction in response to the cyclical deviation of transaction prices, the local governments should supply more development land and also improve the speed of construction permit decisions. This could help to mitigate house price cycles and would stabilize the developer sector. More firms would be willing to enter the market and in sum house prices could be more stable, as demand would be satisfied much quicker.

We distinguished two clubs of cities with similar behaviour of developers (reaction or lack thereof to the most important factors), and these clubs do not necessarily coincide with the price convergence clubs described in the literature. The lack of reaction or even an unconventional reaction of developers

in some smaller markets calls for further research. A potential explanation is that in those smaller markets demand can be satisfied not only by professional housing developers, but also through private construction of detached houses.

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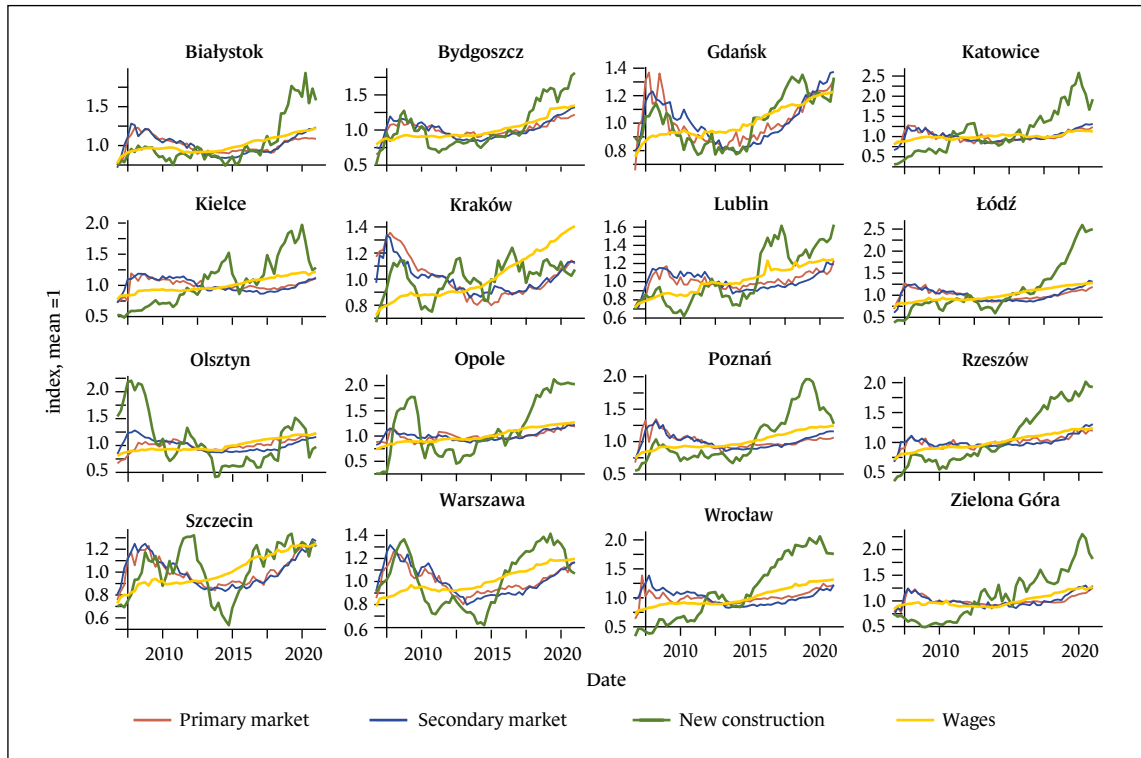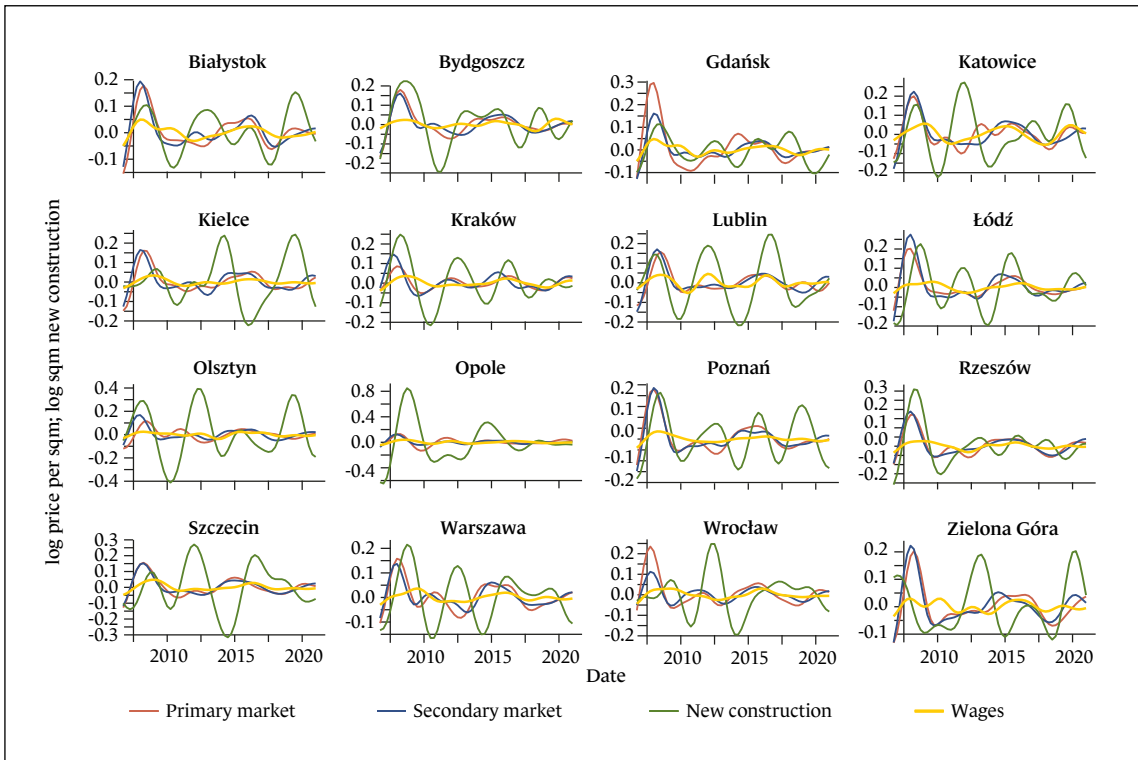
Appendix

Figure 1

Normalised index of logarithms of real house prices, real wage and housing under construction, mean = 1

Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.
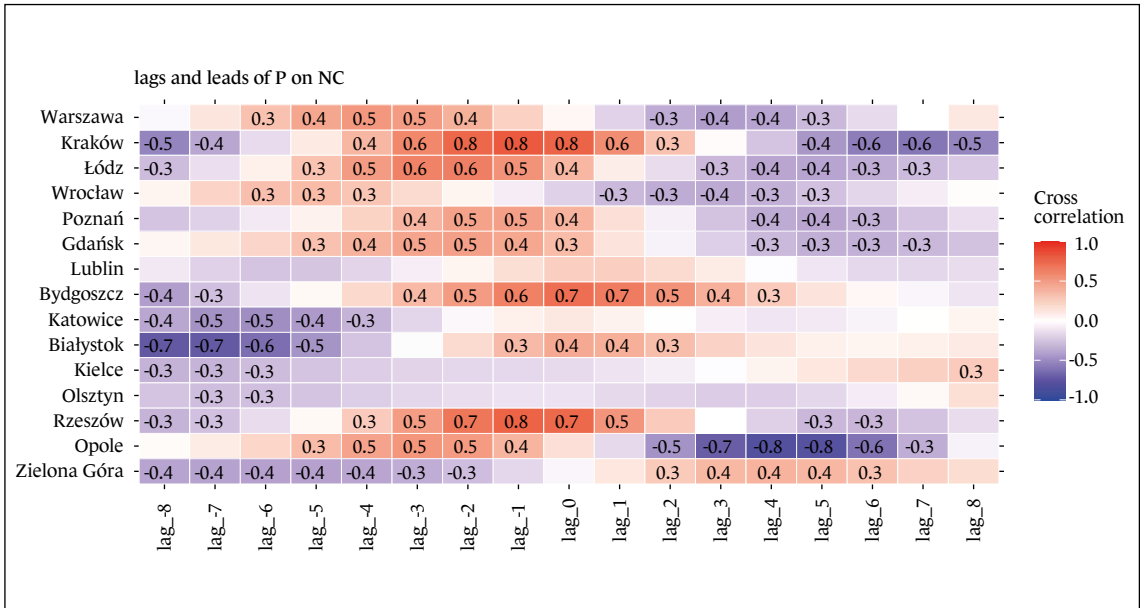
Figure 2

Cyclical component of real house prices, real wage and housing under construction, obtained with the Christiano-Fitzgerald filter

Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.
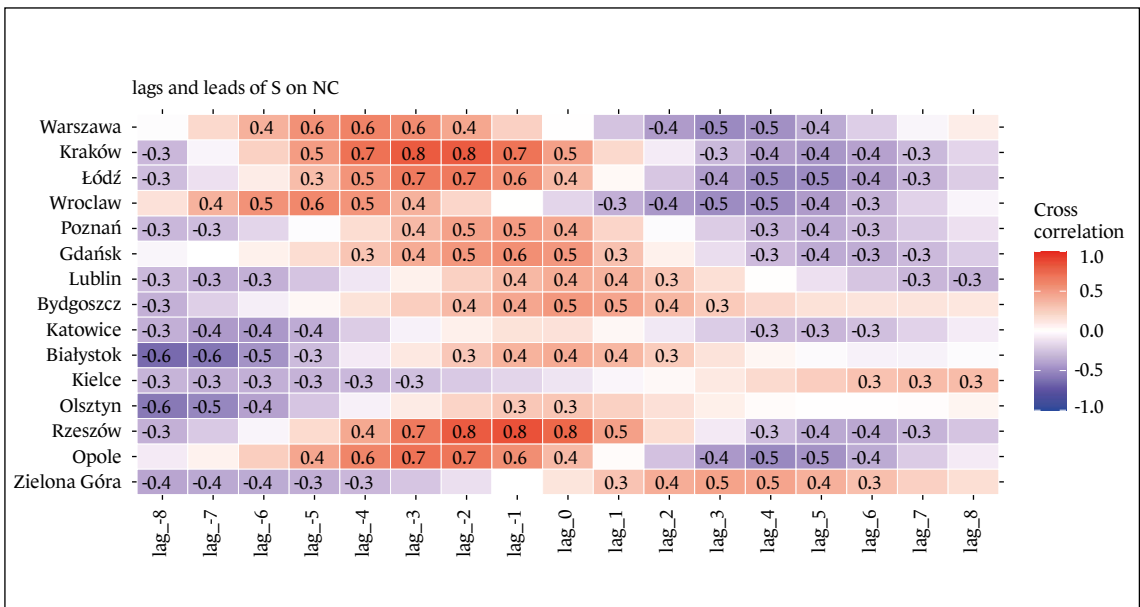
Figure 3

Leads and lags of prices on primary market (P) on new construction (NC)

Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.
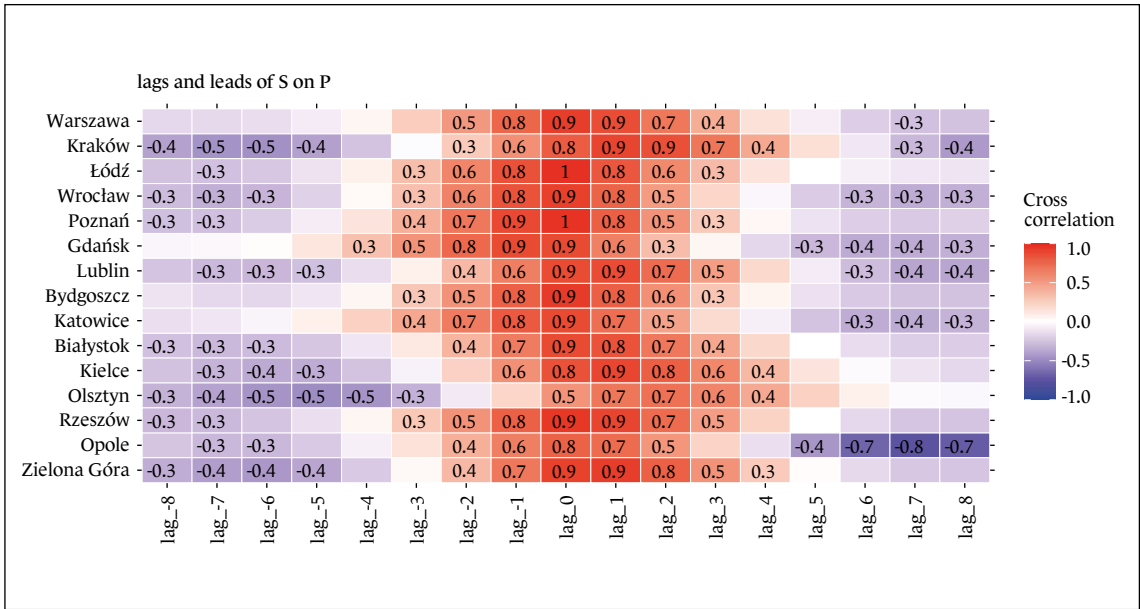
Figure 4

Leads and lags of prices on secondary market (S) on new construction (NC)

Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.
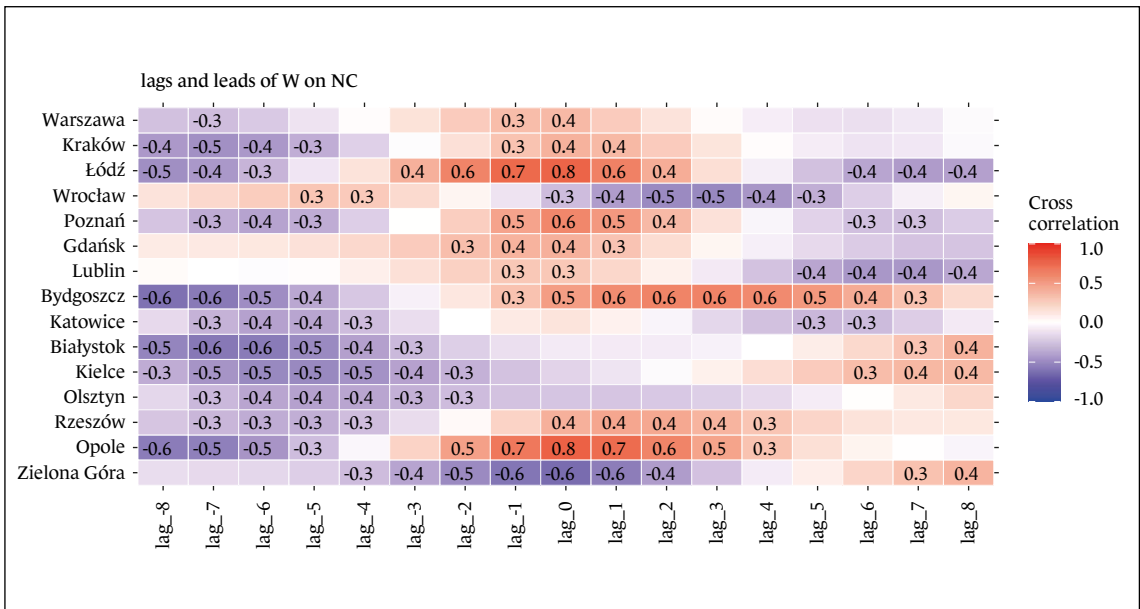
Figure 5

Leads and lags of prices on secondary market (S) on prices on primary market (P)

Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.

Figure 6

Leads and lags of wages (W) on prices on new construction (NC)

Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.

Figure 7

Leads and lags of wages (W) on prices on primary market (P)

Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.

Figure 8

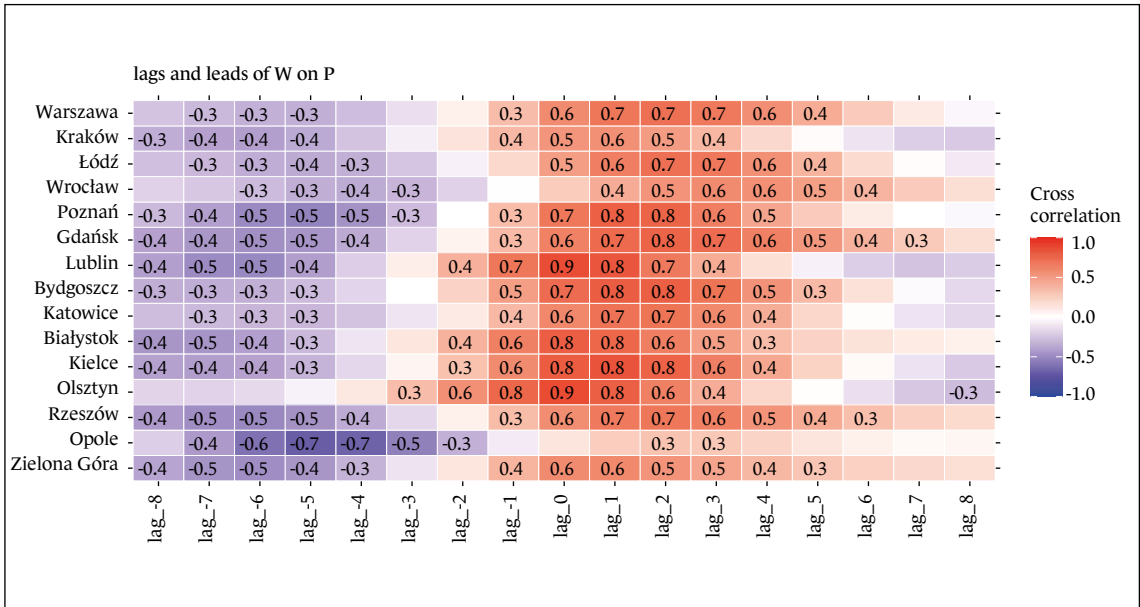Leads and lags of wages (W) on prices on secondary market (S)

Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.

Robustness tests

Figure 9

Leads and lags of prices on primary market (P) on new construction (NC)
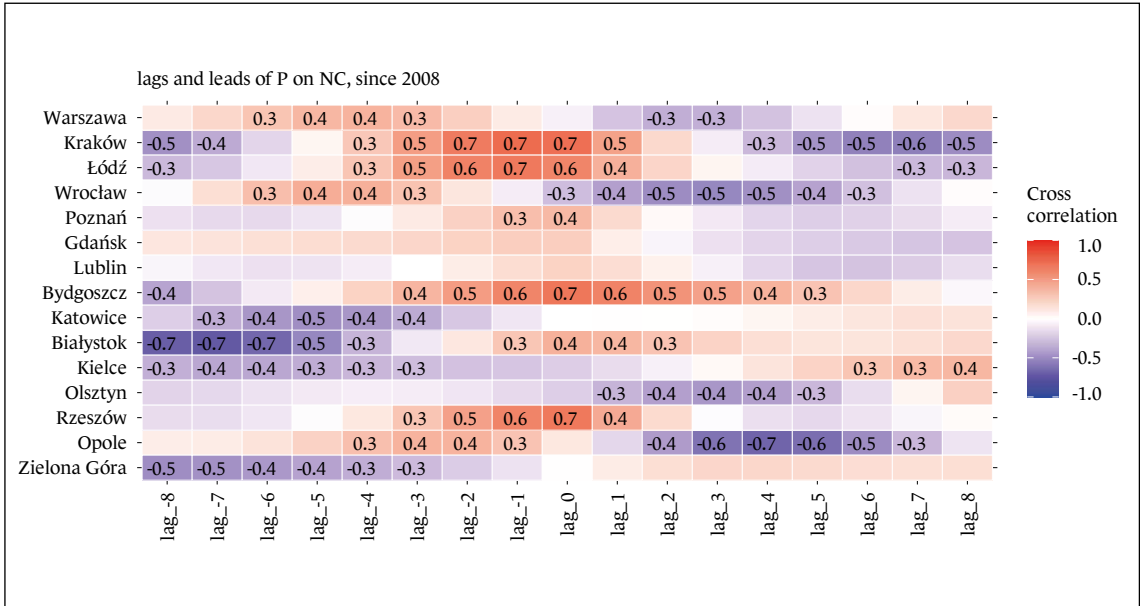
Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.

Figure 10

Leads and lags of prices on primary market (P) on new construction (NC)
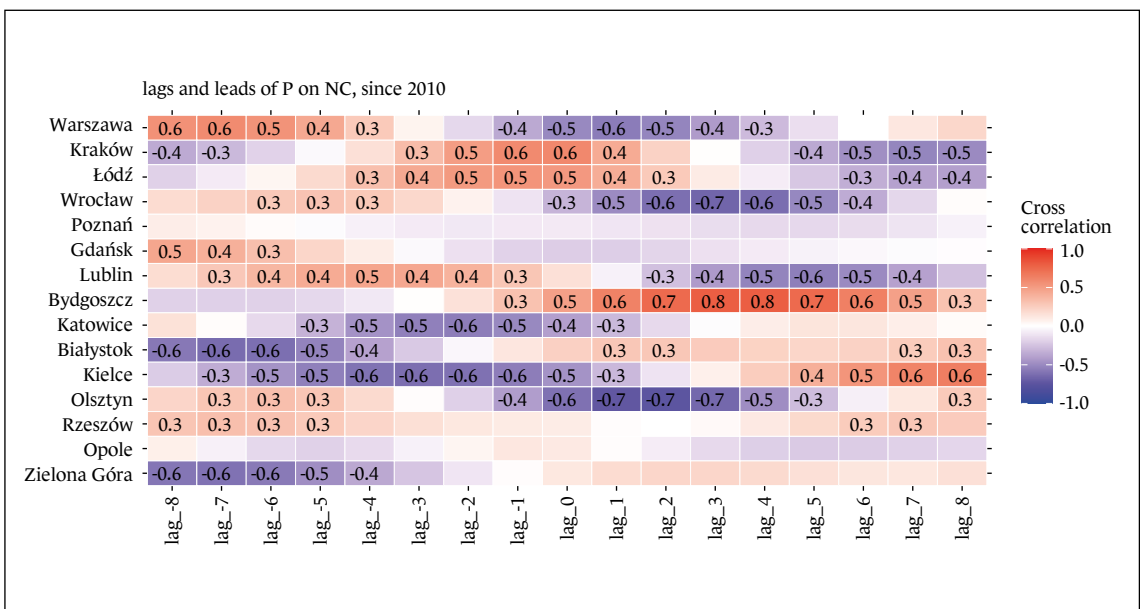
Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.
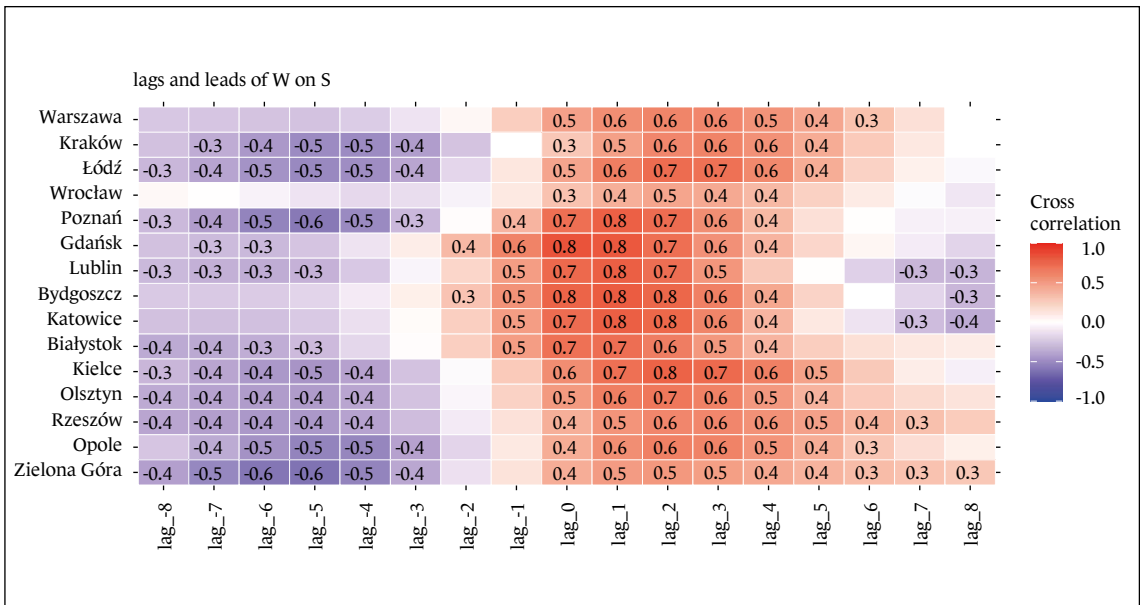
Figure 11

Leads and lags of prices on secondary market (S) on new construction (NC)

lags and leads of S on NC, since 2008
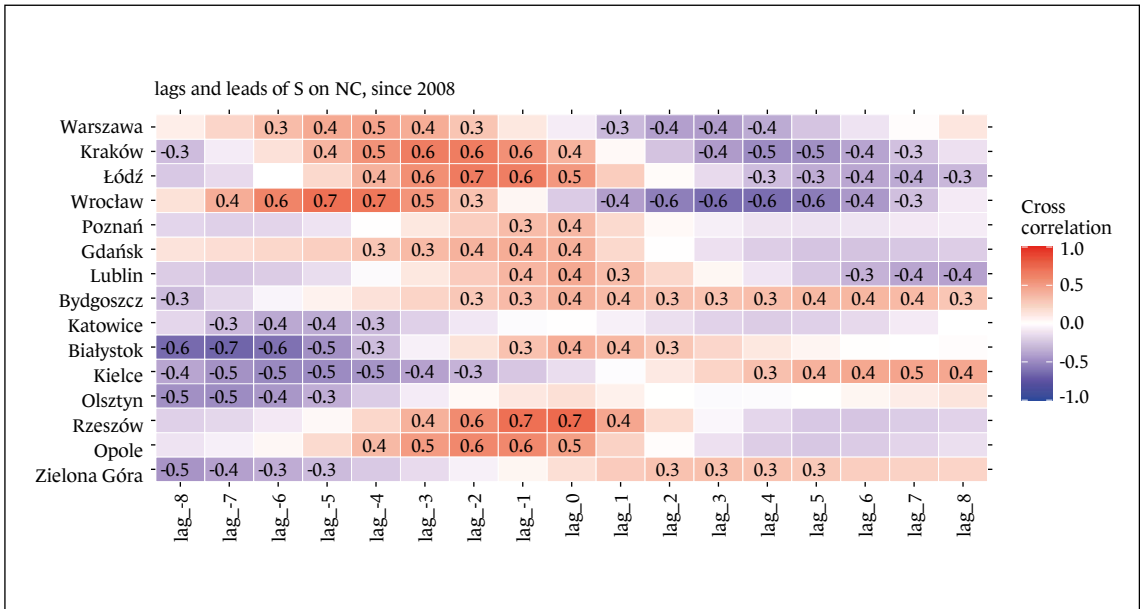
Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.

Figure 12

Leads and lags of prices on secondary market (S) on new construction (NC)

lags and leads of S on NC, since 2010
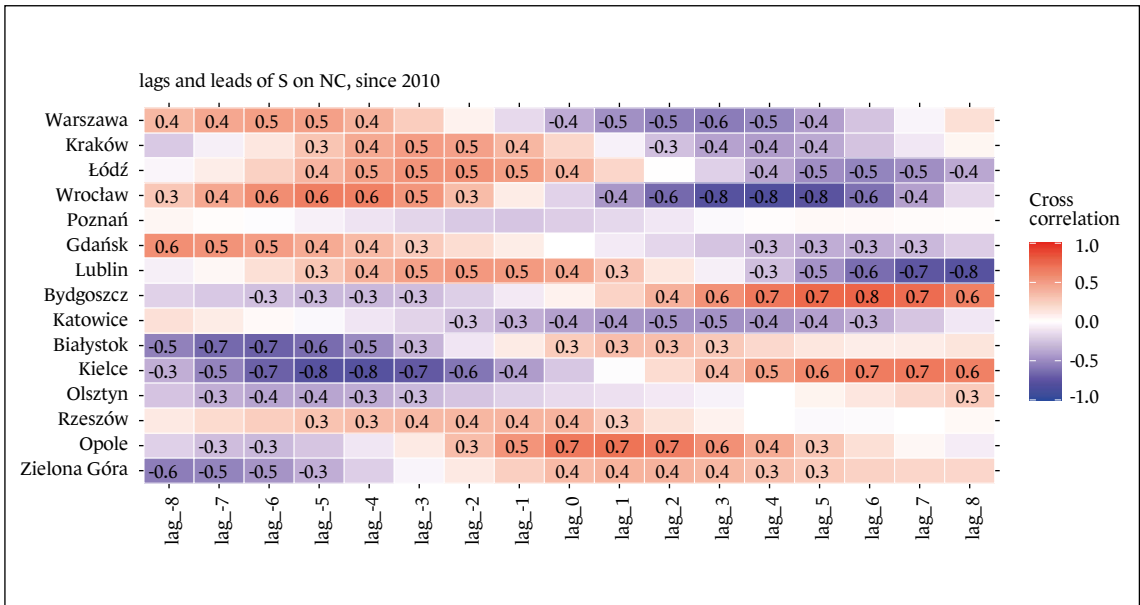
Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.

Figure 13

Leads and lags of prices on secondary market (S) on prices on primary market (P)

lags and leads of S on P, since 2010

	lag_-8	lag_-7	lag_-6	lag_-5	lag_-4	lag_-3	lag_-2	lag_-1	lag_0	lag_1	lag_2	lag_3	lag_4	lag_5	lag_6	lag_7	lag_8
Warszawa	-0.4			0.3	0.5	0.7	0.8	0.9	0.9	0.8	0.6	0.5	0.3				-0.4
Kraków	-0.5	-0.6	-0.6	-0.5	-0.3			0.5	0.7	0.7	0.7	0.6	0.4				
Łódź	-0.4	-0.3				0.4	0.6	0.7	0.9	0.9	0.9	0.8	0.7	0.6	0.5	0.3	
Wrocław				0.3	0.5	0.7	0.8	0.8	0.8	0.6	0.4			-0.3	-0.5	-0.6	-0.7
Poznań	-0.3			0.3	0.5	0.7	0.8	0.9	0.9	0.8	0.7	0.6	0.5	0.4			
Gdańsk	0.4	0.5	0.5	0.6	0.7	0.8	0.8	0.8	0.7	0.5	0.3					-0.3	-0.4
Lublin			0.4	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.4	0.3				
Bydgoszcz			0.4	0.6	0.7	0.8	0.9	0.8	0.8	0.6	0.5	0.3					-0.3
Katowice			0.4	0.5	0.6	0.7	0.7	0.7	0.6	0.6	0.5	0.4				-0.3	-0.4
Białystok			0.3	0.4	0.6	0.7	0.8	0.8	0.7	0.6	0.4						
Kielce						0.3	0.5	0.6	0.8	0.8	0.8	0.8	0.6	0.4			
Olsztyn	-0.7	-0.6	-0.4				0.3	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.3	
Rzeszów	-0.3			0.3	0.5	0.7	0.8	0.8	0.9	0.8	0.7	0.5	0.4	0.3			
Opole		-0.3	-0.3	-0.3			0.3	0.4	0.5	0.4				-0.3	-0.4	-0.4	-0.3
Zielona Góra	-0.5	-0.5	-0.4	-0.3			0.3	0.6	0.8	0.8	0.9	0.8	0.7	0.6	0.4	0.3	

Cross correlation
1.0
0.5
0.0
-0.5
-1.0

Source: own calculation based on NBP (2022) and Statistics Poland (2022) data.

Nierównomierne reakcje podażowe deweloperów na zmiany ceny mieszkań w różnych regionach Polski

Streszczenie

W niniejszym artykule analizujemy zagregowane reakcje deweloperów dotyczące budowy mieszkań w toku w odniesieniu do cen w 16 miastach wojewódzkich, czyli na największych rynkach nieruchomości w Polsce. Naszym celem jest ustalenie, czy deweloperzy w różnych miastach wojewódzkich reagują na bodźce w podobny sposób czy też można zaobserwować istotne różnice. Działania deweloperów są ważne, gdyż jedynie nowe budownictwo może zlikwidować niedobór mieszkań. Problem dostępności mieszkań ma znaczenie dla mobilności pracowników, jest zatem ważnym czynnikiem zrównoważonego rozwoju regionalnego Polski.

Strona popytowa została szeroko przebadana w literaturze światowej i polskiej, jednak strona podażowa jest wciąż niedostatecznie przeanalizowana. Działania poszczególnych deweloperów stanowią ich tajemnicę biznesową i są bardzo trudne do wychwycenia, zatem próbujemy zrozumieć ich reakcje w skali zagregowanej, dla poszczególnych rynków. Nasze badanie jest powiązane z badaniami cykli na rynku mieszkaniowym prezentowanymi m.in. w pracach: André (2010) oraz Leamer (2007), a także z badaniami tego zjawiska dla Polski przeprowadzonymi przez Żelazowskiego (2017) oraz Macha i in. (2021). Żelazowski (2017) wykazał silne korelacje między cyklem cen a cyklem koniunkturalnym, natomiast Mach i in. (2021) przebadali cykliczność nowego budownictwa w Polsce. Zaobserwowali w nim zjawisko policykliczności, to jest jednoczesne występowanie cykli o różnej częstotliwości. Nawiązujemy też do badania konwergencji realnego PKB w województwach Polski (por. Rokicki, Hewings 2017), które zgodnie z teorią relacji cen mieszkań do PKB powinno prowadzić też do konwergencji cen. Tomal (2021) oraz Trojanek i in. (2023) wyodrębnili jednak poszczególne kluby konwergencji dla miast w Polsce, co oznacza, że nie dochodzi do oczekiwanej jednolitej konwergencji cen. Wyjaśnienie tego zjawiska stanowi ciekawe zadanie badawcze. Należy podkreślić, że zasób nieruchomości ma bardzo duże znaczenie dla majętności polskich gospodarstw domowych (por. Wroński 2022).

Do zrozumienia zjawisk na rynku niezbędne jest przebadanie reakcji deweloperów, a ponieważ jest to proces ciągły, stosujemy metodę analizy korelacji wzajemnej. Analizujemy korelację wyprzedzeń i opóźnień cykli cen mieszkań na rynku pierwotnym i wtórnym oraz korelację płac z cyklami mieszkań w budowie. Cykle tych szeregów wyodrębniamy za pomocą filtra Christiano-Fitzgeralda, który został zastosowany przez Łaszka i in. (2021) do analizy cykli cen mieszkań w Polsce, Irlandii oraz Hiszpanii. Metoda korelacji wzajemnej jest szeroko stosowana do analizy podobnych procesów. Lamo i in. (2013) analizowali tak powiązania konsumpcji, wynagrodzeń oraz zatrudnienia w sektorze publicznym w strefie euro, a z kolei Probst, Stelzenmüller i Fock (2012) przebadali w ten sposób relację między wpływem człowieka na środowisko naturalne a populacją ryb w Morzu Północnym. Wyniki zostały przedstawione za pomocą map ciepła (*heatmaps*), które pokazują korelacje i ich kierunki dla wyprzedzeń oraz opóźnień.

Stwierdzamy, że na największych rynkach mieszkaniowych istnieje silna pozytywna korelacja między opóźnieniami cyklicznych odchyleń cen mieszkań na rynku wtórnym a cyklicznym odchyleniem liczby mieszkań w budowie. Na mniejszych rynkach nie można zaobserwować wyraźnych korelacji.

Zauważamy też, co już znane w literaturze, że cykl dochodów oraz cykl cen zarówno na rynku pierwotnym, jak i wtórnym są silnie skorelowane. Wnioskujemy, że wzrost popytu generuje wzrost cen, jednak na największych rynkach rośnie liczba mieszkań w budowie, które z czasem pozwolą zaspokoić zwiększony popyt. Na mniejszych rynkach nie obserwujemy, by odchylenia cen wywołały podobną reakcję po stronie podaży. Zjawisko to wymaga dalszych badań. Możliwe jest, że na tych rynkach ludzie łatwiej mogą zaspokoić swoje potrzeby mieszkaniowe dzięki domom budowanym indywidualnie. W takich warunkach deweloper odczuwa większe ryzyko biznesowe niż deweloper na największych rynkach, na których jedynie dla nielicznych nabywców samodzielna budowa domu jest ekonomicznie dostępna.