The behaviour of housing developers and aggregate housing supply

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Abstract:

The article presents an analysis of the developer sector, which takes into account the observed functioning of the market. The analysis is based on the assumption that the housing developer, due to the asymmetry of information, is able to take advantage of a local monopoly and differentiate prices. This allows him to sell apartments of a similar construction to each client at a different price, thanks to which he maximizes profits. However, when the developer overestimates demand or the competition gets tougher, his production costs grow and the possibility to differentiate prices is reduced. This has a direct impact on the profits that he can generate. The consequence of this phenomenon is a more flexible *ex post* curve of developer supply. As a result, there is a tendency to overproduction in the developer sector, which deepens the cyclical nature of the housing market.

1 Introduction

The developer sector, like the construction sector, is usually considered to be a free-market with strong competition. The basis of such a simplified assessment is usually general statistical data, which shows a high number of active companies, often counted in thousands. However, in the case of both construction firms and developers, we usually observe a high concentration of production. The second significant factor restricting competition is the high cost of entry. This applies to a lesser extent to the capital necessary to build land banks, and to a greater extent to the functioning of the property market, including the residential market. These sectors, also in the old EU countries, are characterised by a high heterogeneity concerning such fundamental issues for housing production as the construction law, local regulations governing the urban planning, acquisition of land for development and building permits, civil law connected with the trade of real estate, tax issues and many more. Moreover, the variety of regulations is not only true of particular countries, but also of local markets. Additionally, in the face of poor information, informal connections are very important

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for conducting business. This causes a weak competition in the international and local markets.

The Polish real estate market (figure 1) seems to confirm this. This market is characterised by a high concentration of production, where firms that have been well established in the market are coping, but new, external players entering the market usually face problems.

Figure 1 Concentration of housing production in the largest markets in Poland (according to the number of produced housing units) in 2012.
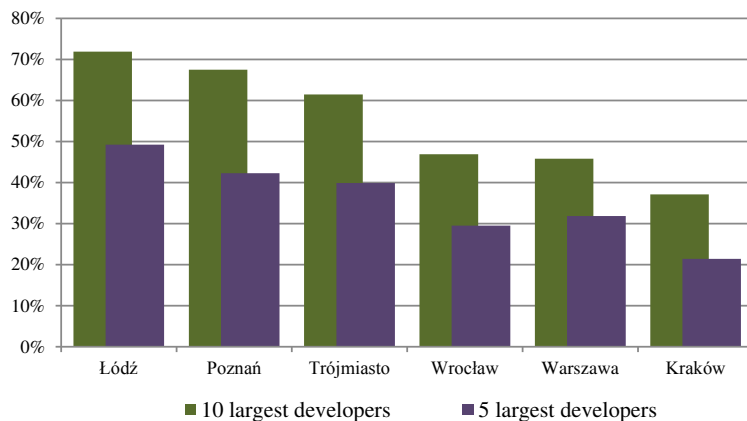
Source: NBP, REAS

In turn, large firms situated in the most important, lucrative markets do not enter into local markets, where local firms operate. Since developer projects in most countries are risky (housing production is such a long processes that completed housing units might not meet a high enough demand) and the developer's client is also burdened with the risk (should the developer become insolvent), the company's good reputation has become a significant competitive advantage. Companies try to compete offering their product, namely the apartment, which is always an individual product, and whose individuality and uniqueness can be demonstrated. All this means that in reality we are dealing more with a kind of monopolistic competition, in other words, a situation in which a certain number of companies supply a similar but different product, apply varied methods of competition and are not price-takers, since in a certain area they can move along the demand curve. Such a situation also does not exclude various forms of monopolistic collusion. In accordance with the basic monopoly theory, in such a situation we should observe high prices on the market, the housing supply should be relatively low, and there should also be significant spare capacity in the construction sector, being the developer's contractor. Moreover, in the situation of a classic monopoly, prices are usually stable since the monopoly optimizes its decisions taking into consideration a longer period of time. This is not observable in the Polish real estate developer sector. Although there is a tendency to maintain high prices, the flexible response to increases in demand and the tendency to generate a housing surplus do not corroborate the occurrence of

behaviour typical for monopolistic competition, not to mention a classical monopoly (figures 2 and 3).

Figure 2 Number of housing units put on the market, sold and present in the offer of the 6 largest markets in Poland*
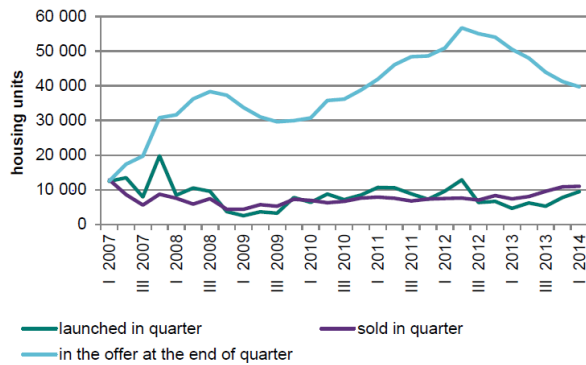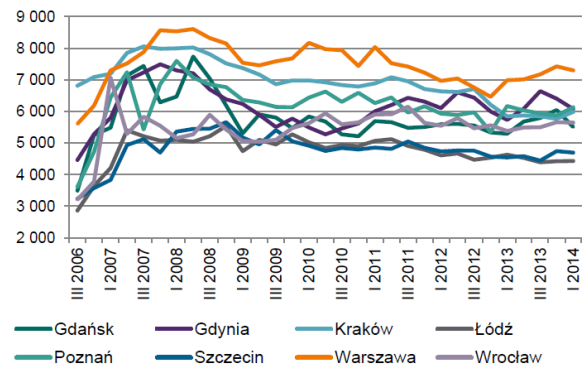
Figure 3 Levels of transaction prices per square metre of an average housing unit in the primary market

*Warsaw, Cracow, Gdynia-Sopot-Gdańsk conglomeration, Wrocław, Poznań, Łódź.
Source: REAS.

Source: NBP.

Interestingly, despite significant similarities in terms of business activity and structures, there are huge differences between construction companies and real estate developers. The indicator analysis shows that construction companies face a much greater competitive pressure, thus achieve a significantly higher rate of return for owners at lower margins (see table 1). This is due to a lower share of own capital in construction companies and a significantly shorter investment period than in the case of the developer. A detailed analysis of the investment process of the housing developer can be found in Augustyniak et al. (2013a). Here we would like to point out that the process begins with the purchase of land, then the developer obtains all the permits, commences construction, and then starts to sell the apartments. However, he accounts profits for them only when they are sold and the handover is completed. The investment process of a construction company is significantly shorter and payment is usually received after completion of subsequent stages. While the developer is still looking for clients for individual apartments, the construction company accounted for the investment long ago and is already in the process of constructing another building. However, a more in-depth analysis of developers shows that an important factor that differentiates them from construction companies are overhead costs, especially the costs of their own companies. These are high since it is a form of tax optimisation. This surplus can also be seen clearly when comparing the profitability of investment projects with the profitability of developers, even after taking into account the natural, higher risk in this sector. Consequently, developers use this surplus as a buffer – they increase it in conditions of economic growth
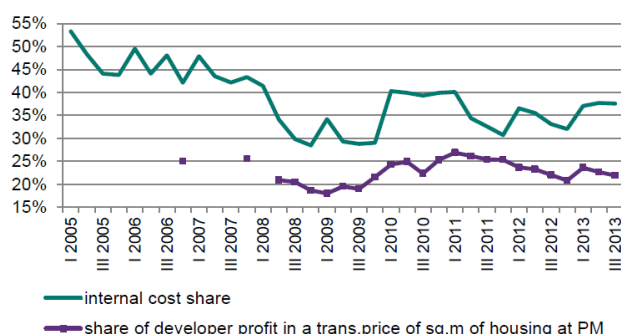
and reduce it when the situation worsens. This is why developers have lower ROE and ROA indicators at similar margins on direct costs.

Table 1. ROE and margins of real estate developers and construction companies.

Companies	1st half 09	1st half 10	1st half 11	1st half 12	1st half 13*
SKANSKA ROE	19.2	19.3	41.1	15.6	19.4
SKANSKA margin	4.2	3.9	11.2	2.3	4.1
developers PL ROE	18.0	13.4	5.0	12.8	4.0
developers PL margin	17.8	13.4	9.4	12.7	7.8
construction companies PL ROE	12.8	13.9	6.5	1.8	0.3
construction companies PL margin	8.0	5.9	3.8	1.0	0.02

*Source: stock market report 1st half 2013 SKANSKA, July 2013; PONT information on the basis of GUS data; * for Polish companies data for 1Q13*

Figure 4a Prices of apartments and own costs of developers

- internal cost share
- share of developer profit in a trans.price of sq.m of housing at PM

Figure 4b ROE of investment projects in 6 largest towns in Poland and ROE of large developers operating in these markets

- Warszawa
- Kraków
- Gdańsk
- Wrocław
- Poznań
- Łódź
- DFD

See NBP (2013) Note: the share of profit of developers until 2007 is exclusively for the last quarters of the year.
Source: NBP calculations based on GUS (F01) and Sekocenbud.
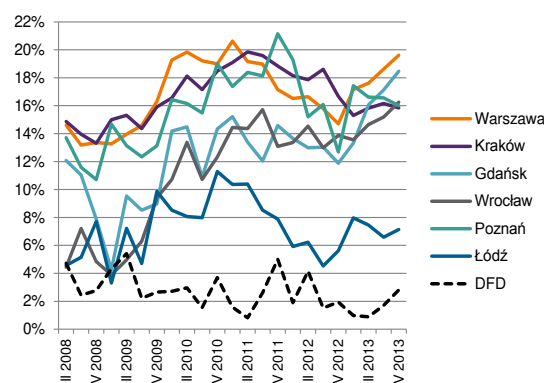
See NBP (2013): Note: the rate of return of own capital from typical newly-commenced investment, assuming current interest rates, bank requirements and costs of production; calculated according to the diagram in appendix 3 in *Report on the situation in the Polish residential and commercial real estate market in 2011.* DFD – ROE of an average large developer firm (GUS).
Source: NBP calculated in the basis of Sekocenbud, GUS (F01).

It can therefore be judged that through higher margins, real estate developers generate extraordinary profits hidden in their own costs as compared to the construction sector facing a

tougher competition. However, since the high concentration of production in itself and the potential monopolistic practices related to it fail to accurately explain this phenomenon, it is necessary to look for other explanations as to how developers achieve extraordinary profits and how it affects the functioning of the market. A promising solution may be to combine the monopolistic competition model with the price discrimination monopoly model. Therefore, we are going to address the following three issues.

1. The first issue is the supply response of the developer and the whole sector.
2. The second issue is the functioning of the developer in the conditions resembling a discriminating monopoly, or strict competition of this type of monopoly (monopolistic competition) in the market.
3. The third issue is the price response mechanism in this model and the client's appraisal of housing, which implies changes in the demand curve.

2. Analysis of supply of developers and the developer sector

The analysis of residential housing production on a macroeconomic scale, described by DiPasquale and Wheaton (1992), DiPasquale (1999) and Wheaton (1999) is a standard in the world literature. The empirical analysis of this issue was conducted by, among others, Stover (1986), Epple et al. (2010) and Levin and Pryce (2009). A combined empirical analysis of supply and demand can be found in Tse et al. (1999), Phang et al. (2010) and Steiner (2010). Augustyniak et al. (2013b) have expanded the above-mentioned analyses, taking into account the interaction between the primary market and the secondary market, which has a significant influence on the formation of cycles in the housing market. The papers presented above aim to explain the formation of cycles in the real estate market. Although DiPasquale (1999) asks why we do not know more about developer production, so far the literature has not dealt with the issue with sufficient thoroughness. A likely problem is the access to data on individual developer projects, which would allow an accurate estimation of their production function. The analysis of the developer market presented in this article and in NBP (2011-2013) shows that the developer production is very diverse. The aim of this article is to take a more in-depth look at the behaviour of individual developers, which translates into the behaviour of the whole market. In order to properly analyse the developer's actions it was necessary to depart from the classical analysis of a company producing a standard good and analyse the way in which the developer actually operates.

A developer operates in the residential housing market which is an uncertain, changing environment. Moreover, the developer must make a whole range of optimisation decisions under high uncertainty. These include the following:

1. Decision on the segment of the market, i.e. whether commercial or residential investment. In addition he has to decide whether he is only a developer constructing, possibly commercialising the property, both residential and commercial, or whether he will also lease the property.

2. In the case of residential property he must take a decision about construction techniques, i.e. about the proportions of production factors involved: labour, capital and land. Decisions related to the proportions of capital and labour input are usually connected with the usage of the so-called prefabrication or industrialisation of construction, while the use of the land factor means to a greater extent the optimisation of housing characteristics rather than the process of production (location and design of the building).

3. Another optimisation is the size of production and its quality. Optimisation of quality is a choice of a basket of qualitative characteristics of housing based on the market valuation of these features and their cost of production. This is the answer to the question of how much and what type of quality the housing should contain. The final problem is the optimisation of the size of the production of housing units possessing a specific feature. This takes into consideration the possible price of the apartment that can be obtained on the market, as well as its costs and size of production. Therefore the solution is not an unique point, but a line that contains an infinite number of optimal points.

We rise the optimisation problem from the point of view of the market price, costs of production and size of production. Together with an analysis of the structure of characteristics and the value of housing (point 3), these are the fundamental decisions of the developer that decide about his market success.

When choosing how much housing to produce and to put on the market, the developer sector faces the inventory problem described by Maisel (1963). Similarly to other producing firms, developers have an inventory of completed housing on the market and whenever a household purchases a dwelling, this inventory decreases. To increase this inventory, developers need to construct new housing. An important question the developer has to face is the choice of the time and the size of new construction. The problem can be solved by the inventory control model that was introduced in its mathematical form by Arrow et al. (1951). The so called (S,s) problem is to find an optimal minimum level s of the inventory, at which to upgrade the inventory to its optimal level S. Uncertainty about the costs and the demand make the problem quite difficult. The costs are holding costs of a too large portfolio of properties, the potential lost profits if not enough houses are on stock and finally, the costs of starting a new development process. All these costs depend on the current economic situation, for example during a housing boom period the holding cost might be low, as the housing stock can be sold quickly, but the costs of starting a new project can be high if land and labor are scarce goods. According to Topel and Rosen 1998, the adjustment costs are higher upwards and lower downwards, however in our view there are also significant sunk costs, especially as the start of the project is concerned. While labor and material input can be changed by relatively small amounts, the developer buys land in one location to build several hundreds of housing units. Due to the availability on the market it is impossible to buy small portions of land, thus here the adjustment costs are huge. Those abovementioned fac-

tors make the planning of the optimal production size of housing much more difficult than in most other productive sectors.

The costs of the developer do not lend themselves to the classical production function and the related law of diminishing returns. A developer is not a production company in the strict sense of the word, he is only an organiser of the production and its funding. He realises the production by initiating successive projects and increasing the number of constructed apartments in the project. The limitation is the possibility of remaining in control of the logistics of the project, in particular, in control of the quality of production. The developer employs construction companies to realise his projects. He uses bank loans, which cannot, however, exceed a certain value of the realised investment (the so-called LTC, loan to cost ratio), usually 50-80% depending on the risk of the developer and the market. Consequently, the unit costs of the developer are always diminishing as a function of the size of production, while marginal costs are constant, likening it to a natural monopoly. The evolution of total costs, unit costs and marginal costs of a developer obtained on the basis of a simple model of such a company, which is a generalisation of actual business plans, is presented in Figure 5.

Figure 5. Total costs*, unit costs and marginal costs of a developer
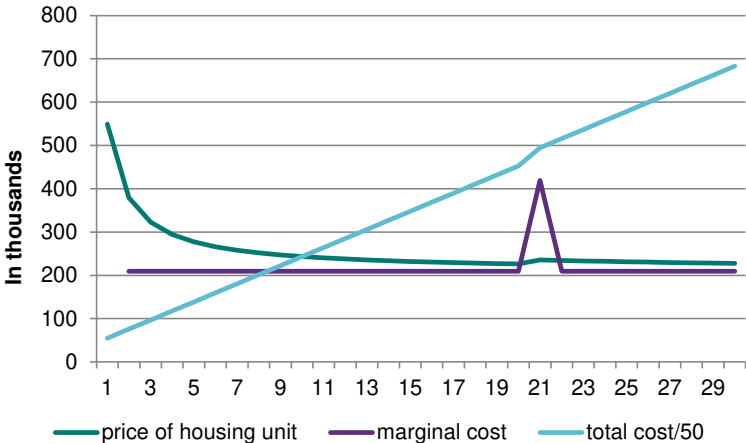
*Note: *Total costs are divided by 50 in order to maintain proportionality of the graph and a uniform scale.*

A typical situation of a medium-sized developer with a capital of PLN 10 million was modelled. The company increased housing production in increments of 5 housing units. At a production size of 100 housing units, the LTC ratio reached the level of 80% and at the request of the bank the company had to be recapitalised to the level of PLN 25 million in order to continue to expand. The related decline in the leverage ratio caused a noticeable increase in costs in the 21st quarter, as seen in the graph.

The marginal cost curve expected by the company will be flat or almost flat and the developer will take this into account when planning future projects. As an individual company, even

with large market expansion, he is not able to cause significant changes in factor prices. Similarly, the expected aggregate cost curve of the developer sector will be flat, since developers do not know the plans of other companies and they do not balance the availability of factors of production in the sector; consequently, each of them will treat the expansion of their company as insignificant for the market.

Proceeding from an analysis of an individual real estate development enterprise to an analysis of the real estate developer sector, it can be concluded that aggregate costs of construction and assembly output rise in the short-term. This is driven by two factors. The first is the construction companies' desire to have a greater share in developer profits, which rise as a result of growing demand and home prices. The second are rising costs of obtaining an ever-growing quantity of materials and labour force (transport of materials over greater distances, obtaining foreign workers etc.). The price of plots of land is also on the rise, their preparation requires time, and the availability of attractive locations is physically limited. A more detailed description of the developer's supply curve can be found in Augustyniak et al. (2012). The expected (V) and the actual (F) aggregate short-term supply in the real estate development market is presented in Figure 6.

Figure 6. Expected and actual aggregate supply in the local real estate development market and medium-term supply.
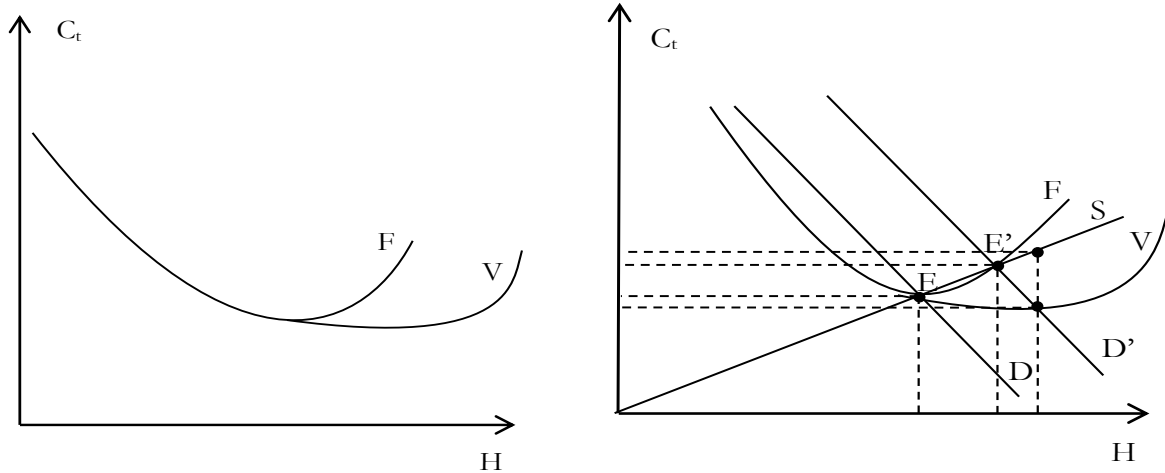
Costs of construction and assembly output rise along with the rise in housing demand and home prices, as illustrated empirically in Figure 7. Since in the period 2006-2008 the number of sold developer apartments began to soar, construction and assembly production prices grew rapidly and did not see any significant drop later on. The next cost factor are other costs such as the price of land. These costs also rose during this period; however, on the account of falling demand they began to sink. It can be noticed that developers adjusted their margins depending on market conditions. These issues are discussed in detail in the following part of the article. At this point it should be emphasized that optimal individual behaviour leads to the creation of cycles, which has already been shown by Hanau (1928).

Figure 7. Price per square metre of housing (building type 1121[3]) (including the accumulated profit of developer, costs of construction and assembly output, and other costs) in Warsaw in conditions of demand shock.
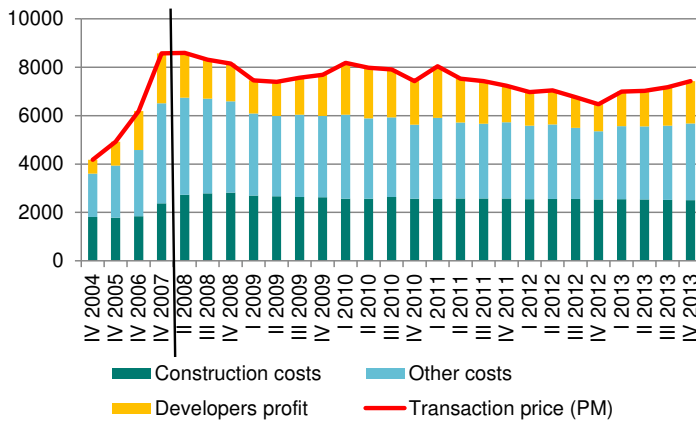
Source: BaRN NBP and Sekocenbud. Until 2007 annual data.

3. The developer in the housing market

When considering the behaviour of developers in the housing market, it is worth considering the difference between the market of products for construction companies and the developer, who is often identified with the construction firm. The main difference between these firms is due to the fact that construction companies operate in a professional construction market, while developers operate in a consumer housing market, where the buyers of their goods are individual consumers. It is also important that construction and assembly output realised on the basis of contracts for residential housing construction is rather homogenous, despite the production of diverse buildings, while apartments which are the product of the developer are highly heterogeneous and unique goods[4]. This has two significant consequences:

Basically, every well-planned developer building is in a sense unique, taking into account not least the monopoly of location, not to mention the architecture, concept of utility and other factors influencing the standard of housing. This causes its monopolistic character,

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[3] See NBP (2013) "Building (type 1121) monitored by NBP since the second half of 2004: average residential, multifamily, five-storey building with underground garage and service spaces on the ground floor; traditional construction (above-ground part of the building from ceramic brick). For simplicity it has been assumed that the costs per square metre of building the garage and service spaces are similar to the costs of building the apartment to the developer standard. The actual price per square metre of an apartment, based on the costs of construction, depends on the proportion of external surfaces, different for different buildings. When calculating the price per square metre of usable area of apartment for the consumer, a 20 percent share of external surfaces in relation to housing area has been assumed and the price per square metre of apartment has been adjusted upwards by this amount. Data have been adjusted to the new model of the developer construction process, which is more widely described in article 3 in *Report on the situation in the Polish residential and commercial real estate market in 2011.*"

[4] Analysis of a heterogenic apartment from the point of view of the consumer is presented by Łaszek (2013), while an empirical analysis of this phenomenon is presented by Tomczyk and Widłak (2010), Widłak (2010), Widłak (2013) and Waszczuk (2013).

in other words the restriction of competition of other buildings, exactly the same or very similar, and provides the opportunity to achieve higher prices than in the case of other, homogeneous goods. Sometimes the name of a company that symbolises its credibility against the high risk inherent in this market can help to implement such a strategy. Such a situation can be compared to a round-the-corner shop which is expensive, but nearby, and additionally has a friendly shopkeeper, which is why we accept its slightly higher prices. Of course, as in the case of monopolistic competition, if the developer exaggerates with the level of the prices, we will go to another one, accepting a worse match of our preferences.

Apartments are goods sold in individual contact with the real estate developer, which provides an opportunity to take advantage of a situation, which is typical for a discriminating monopoly[5]. Firstly, he can offer each client an apartment at a different price, without fear that this price will become the market price. Therefore he has the possibility of market differentiation. Secondly, during individual talks with the client he is able to obtain information on the maximum price the client would be willing to pay. This gives the developer the possibility to offer the maximum price and get the consumer surplus. The textbooks describing price discrimination point out that this maximum price is very difficult to achieve since the seller would have to know the reservation price of all the consumers. However, on the housing market it works at least because of the strong herding behaviour described by Hott (2012). Due to the herd instinct, the buyer does not have much time to verify the price, while being fed by the developer's marketing. Moreover, the developer applies a psychological trick, offering housing at a much lower price. This is the famous "starting from" price. But when the buyer makes an effort, goes to the place and sees a new, interesting building, then the developer begins to offer him a much better, and of course much more expensive, apartment. He is then able to personally test how much the client is willing to pay. He adds the information that this is the last such apartment. The asking price is usually much higher and allows the potential buyer to bargain. In this way the buyer is under pressure, but, on the other hand, satisfied that he managed to win with the developer and buy housing at a bargain price. A similar situation can be observed in the car market.

The differences between the developer company and the developer sector operating in the conditions of free competition, monopoly, and discriminating monopoly are explained in figure 8. The model assumes that the developer can move within his range of offered products along his own individual demand curve, which is part of the aggregate demand in this market. To the extent that he can move along his part of the aggregate demand curve, the individual expected cost curve of a developer is flat. Since he can start up more investment projects, the cost curve coincides with marginal takings, which are equal to price. Therefore, a developer in free competition does not generate extraordinary profits, only an average rate of return adjusted by the sector risk. Since marginal costs are flat and coincide with the price, the supply of the company is perfectly flexible and dependent on market demand. A dis-

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[5] An in-depth analysis of discriminating monopoly and price discrimination may be found in the work by McAfee (2008).

criminating monopoly is able to offer everyone an individual price at such a level that the consumer would still be willing to pay for the apartment. Consequently, we move along the AB''' curve, which is the demand curve, or more precisely, a section of the aggregate curve which the seller has control over. Since he is able to keep buyers separate, he can offer each one an individual price p1…p5, and establish the production at level B''', in other words, as in the case of free competition. In this situation, the demand curve and marginal takings coincide, while the demand curve of the sector is the aggregate demand curve, as in a free market economy. Only the average realised price is higher, which creates extraordinary profits.

Figure 8. The developer in the monopolistic competition market under free competition and discriminating monopoly
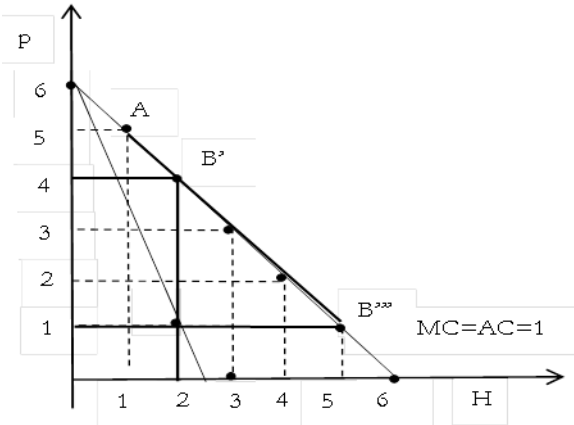
If there was free competition in the market, the size of production would be on the same level, but the price for all buyers would be set at level p1, in other words 1, which would result in economic profit only – there would be no extraordinary profit for the developer. If, in contrast, the market was monopolised in the classic sense, then the monopoly would produce until marginal takings intersect with marginal costs (point B''), and would set the price at level 4 and produce 2 apartments. In this case extraordinary profits would amount to 6 units (the developer produces 2 units at a unit cost, each one is sold for 4 units). However, the most effective in realising extraordinary profits will be discriminating monopoly. Although on average prices are lower than in monopoly (3 instead of 4), the developers profits are higher and will amount to 10. He will produce as much as in free competition, but will adjust the price to the possibilities of each buyer.

Therefore it is worth summarising, that in the case of a discriminating monopoly, market prices rise significantly compared to free market prices and extraordinary profits arise. This will take place despite the fact that the developer will move along the same demand curve as the free market sector, and therefore will not limit his production. Such a situation will take place regardless of the increase in costs. Although the final sales price will be equal to the price for equilibrium in conditions of free competition, the average of all prices will be considerably higher. This dependence can be seen in Table 2. For free competition the

price will always amount to 1, for a monopoly 4, but for a discriminating monopoly the price of each apartment will be different, while the average price will be 3.

Table 2 and the basic formulas contained therein explain in detail the diagram. Both the model and Table 2, assume, for simplicity, that the subject of production are whole apartments, thus although the optimum production is 2.5 apartments, it has been set at 2 apartments. In reality, housing units are to a certain extent divisible, since we have the possibility to differentiate their size and standard, and therefore also the sales price. This is why the demand curve, especially in terms of value, does not have to be described in integral numbers.

Table 2 Calculation of price, profit and size of production in conditions of free competition, monopoly, and discriminating monopoly.

Number of apartments	UP= unit price	TR=total revenue	TC= total costs	AC= unit costs	Free competition			Monopoly		Discriminating monopoly		
					MC= marginal cost TCt+1 -TCt	UP= unit price	TP= total profit TR-TC	MR= marginal revenue MRt+1-MRt	MC= marginal cost TCt+1 -TCt	TR'= total revenue	TC= total cost	TP= total profit TR-TC
1	2	3	4	5	6	7	8	9	10	11	12	13
		(1*2)		(3/1)	TCt+1 -TCt		(3-4)	MRt+1-MRt	TCt+1 -TCt	TR1+… TRn	4	(11-12)
1	5	5	1	1	1	5	4	-	1	5	1	4
_2_	**_4_**	8	2	1	1	4	**_6_**	**_3_**	**_1_**	5+4=9	2	7
3	3	9	3	1	1	3	6	1	1	5+4+3=12	3	9
4	2	8	4	1	1	2	4	-1	1	5+4+3+2 =14	4	10
_5_	1	5	5	**_1_**	**_1_**	**_1_**	**_0_**	-3	1	5+4+3+2 +1=15	5	**_10_**

The situation shown in the graph is highly hypothetical and serves to explain the mechanism only. It is a pure discriminating monopoly, i.e. we assume that it is able to separate and limit the potential arbitrage of its apartments, which actually will take place, especially in the case of preliminary agreements (low cost transactions). Such behaviour of developers is indeed quite common since they try in various ways to restrict the transactions with contracts for housing construction in order to restrict the market mechanism, which equalises prices and limits their profits. It should be added that the analysis of the market in Hong Kong by Lai et al. (2004) shows that sales of contracts by developers not only limit the risk related to the project, but also limit the competition in the market and lead to oligopoly. Both their theoretical model and empirical observations show that developers with a good reputation are able

to sell contracts at a higher price and at an earlier stage of production than unknown, new developers. In this way, older, well established developers hinder market access to young developers and restrict competition. Regarding price discrimination, one can notice that the developer does not have the full possibility to differentiate prices due to the lack of full information about the client and competition of other developers (monopolistic competition). This is why he can move along the demand curve, which is flatter and lies below our average, therefore price discrimination will give lower profits and, after a certain upper limit is exceeded, it will simply break off (in our example when offering an apartment at the price of 6 units demand amounts to zero, because clients will go to the competition).

Let's confront these model assumptions with reality. In our example the average price came to 3 units, and standard deviation was 1.2. In the case of the Warsaw market, the actual price oscillated around PLN 8000 per square metre with a deviation of PLN 1500-2000 per square metre (Figure 9). Therefore, the actual scale of price discrimination is twice as low as in our example. It should be remembered that part of the effect of price discrimination can be attributed to different standards of housing. If we were to refer to this data, then the standard deviation in our model would be closer to 0.5, which would mean that prices of individual dwellings will oscillate closer to the average (3) and would change according to the series 4; 3.5; 3.0; 2.5; 2.0 and not as in the example in Table 1. As it can be easily calculated, also in this case he will generate a maximum revenue (15) and profits (10). However, the even flatter demand curve obtained from the empirical data means that the supply reaction of the developer will be even stronger.

The price discrimination strategy involves some risk since over time the asymmetry of information and the local monopoly can lose its validity. This happens for two reasons. Firstly, the more owners of apartments there are in a given location, the more information will circulate. For example, when a building is handed over, potential buyers will be able to verify how many apartments remain empty. However, the developer cannot extend the procedure of price discrimination too long, since on the one hand the costs of keeping unsold housing rise, and on the other hand, there is a growing risk that competition will emerge and as a result the developer will lose his advantage in negotiations.

One should remember that time may also work in favour of the developer, since the more advanced the construction is, the lower the risk for the buyer and the more his reserve price will grow. The profit function of the developer under price differentiation can be expressed as follows:

$$\pi = p(t,k) - c(t), \quad where \; p'(t) < 0, p'(k) < 0, c'(t) > 0$$

Over time the price $p(t,k)$, which the developer can obtain will fall. The price will also fall in the case of growing competition. This allows us to include the element of the market cycle, i.e. the boom and slowdown phases of demand. And so, in the growth phase demand grows rapidly, which translates into a rapid fall in competition. There are more clients interested in the same number of apartments. However, in the phase of declining demand, a certain number of apartments meets a declining number of interested and potential clients,

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therefore the competition on the developer market grows rapidly. We also assume that costs $c(t)$ always rise over time.

Therefore, let us summarise what external conditions will influence the behaviour and financial performance of the developer. In conditions of weak transparency of the market the developer applies the most profitable strategy of price discrimination. When the market is transparent but with a high concentration of production, as a second best option he applies classic monopolistic techniques, in other words, high prices and rationalisation of production. Only a high transparency of the market and consumer education combined with a high competition guarantee normal conditions of free competition: high production and prices ensuring normal profits.

Therefore, the mere restriction of the concentration of production, recognised as the classic tool in the struggle against monopoly, does not restrict monopolistic practices in this market, if it is not combined with high transparency of the market and consumer education.

These factors have a significant influence on the behaviour of developers in the residential housing market. The combination of a relatively flat demand curve with flat marginal costs and expected high profits generated from price discrimination, causes a tendency to overproduction of apartments. In such combinations of cost and demand curves, demand shocks in the market will have a multiplier effect on production growth.

The above mechanism will operate even if we assume that the developer foresees certain changes in costs and that his ability to differentiate prices is not perfect. In this case, the fundamental factor will be excessive optimism in the time of an economic upturn and the pursuit of profit, which are characteristic of this sector. Such a situation combined with the multiplier effects on the part of demand (see Augustyniak et al. 2013b) will lead to cyclical shortcomings in the stability of the whole sector. The increase in demand will cause a sharp increase in newly-started projects and the resulting increase in production costs. Consequently, supply will increase and prices will stiffen at a high level reflecting rising costs. If, in addition, demand is caused by an increase in income or the increase in income is a significant factor behind rising demand, then explained in the further part of the study, the market will see a significant surplus of small apartments, which will require many years to be absorbed and will cause problems for the sector. If demand growth is caused by migrations and an increase in the number of households, then a surplus of large, costly apartments will appear.

The price discrimination strategy caused by changes in demand could be one of the explanations of the observed high, short-term, upward elasticity of prices. Noticing changes in demand, the developer raises asking prices in order to finally negotiate them lower with certain clients. On the market we will observe a wedge between asking prices and transaction prices. He can also try to apply a commonly known technique of group behaviour stimulation and incitement to speculative purchases. He can also use the phenomenon observed in real estate markets whereby one transaction influences the remaining transactions which are in close proximity but which have no connection with the valuation of the attributes of housing (so-called spatial autocorrelation). Therefore, he can take advantage of the fact that the first apartments have been sold to clients with higher income and preferences towards

these apartments in order to then use the argument of the high value of the apartments in this building or estate during future price negotiations.

Below we discuss selected behaviour of developers in the residential real estate market in conditions of monopoly, monopolistic competition, discriminating monopoly, and free competition. Tenders seem to be a good technique to perfectly differentiate prices, including in the residential housing market. Yet, observation of the practice shows that tenders in residential property market, whilst they do occur during a period of boom, are, however, rare. The model that has been adopted widely and is also effective is the rather high asking price adjusted downwards in negotiations and successive transactions as the number of clients willing to buy is diminishes. Such behaviour is also confirmed by analyses of average asking prices (listed in the market, put on the market for the first time), including, in particular, asking prices and transaction prices from very similar samples, except for them being stretched in time (first the offer, then the transaction), as well as transaction prices, in various cross-sections (figure 9). Comparing these figures to the state of economic conditions measured by the sale of homes, payment of loans, and loan availability of housing (see NBP 2013), we can draw a conclusion as to what sales techniques developers apply, whether consciously or intuitively.

Figure 9. Asking and transaction prices (left axis) and standard deviations (right axis, in units of price) of apartments in the residential development market in Warsaw
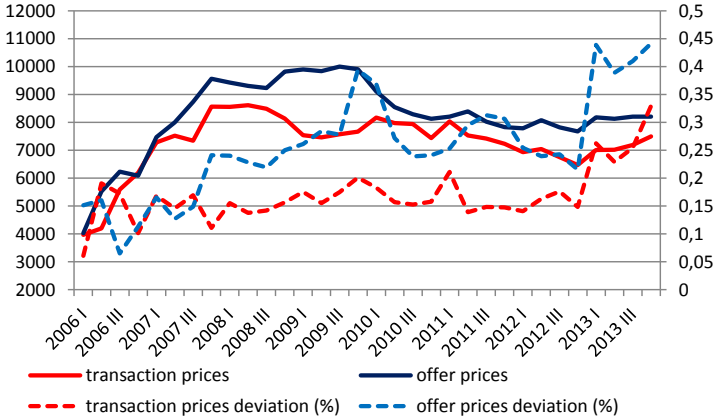

Asking prices are significantly higher than transaction prices, particularly in periods of downturn (surplus of apartments in the market). Then, developers lead high, but in price negotiations they turn out to be flexible (year 2009, then years 2012-13). In a boom period (year 2007) both prices are close to one another, since clients take what is offered in the market without bargaining, and in addition the rapid growth in transaction prices from the moment of signing the reservation agreement until the signing of the final agreement compensates the difference between the asking price and the transaction price. The second significant factor informing us about such behaviour is the high standard deviation (of approximately 15%), between similar quality housing units, which leads to a high differentiation of their transaction prices. The average price range of approximately PLN 3000 - 4000 means

that similar apartments sell for prices ranging between PLN 6000 and PLN 12000 per square metre with an average level of PLN 8000. Interestingly, in the discussed whole period, the lower price limit is stable at a level of PLN 5000 per square metre and marks the lower limits of profitable production, which points to the rationalisation of behaviour.

Let us consider some other elements of the developer's behaviour in the residential housing market, using facts about price development in these markets. As we analysed in the first part, surplus demand from the secondary market ends up on the primary market, which is a result of the increasing number of buyers and income growth. In the case of income growth, people with the highest incomes who are looking for the highest standard housing can end up there. Let us analyse two situations. In the first, demand and its structure in the primary and secondary market is stable; however, changes in incomes occur. In the second, the structure, income and the number of buyers change. Let us consider the simplest case (figure 10).

Figure 10 Free competition (on the left) and discriminatory monopoly (on the right)
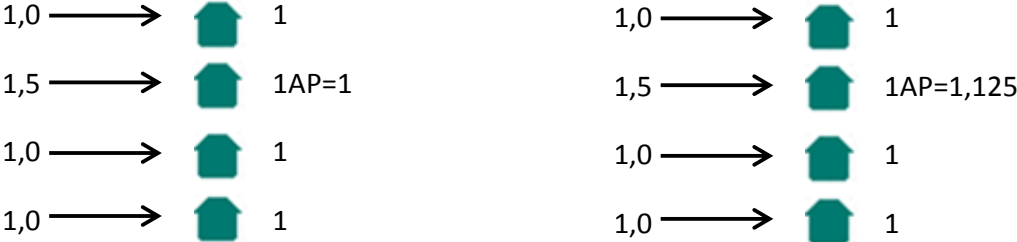
If there are 3 similar apartments in a free competition market and the equilibrium price has been reached, then even despite an increase in income of one of the households, prices do not have to rise, since a mere increase in income does not generate such a mechanism. Moreover, if there is a surplus of apartments in the market, which is usually the norm, an increase in the price of one causes a shift in demand to the competition, in other words to the last apartment. However, a situation of price increases occurs in the case of discriminating monopoly since every entrepreneur finds out about the client's financial condition after a short conversation (for example, he asks about income when advising him which credit to take). He will try to sell him an apartment at a higher price, based on the client's lack of market information and his interest in a specific apartment. Another possible mechanism is the autonomous price increases by the developer, indexed, for example, by credit payments or market timing, followed by individual price negotiations and possible discounts. We have observed such a mechanism in Poland. Therefore, the price reaction will be elastic and he will be able to sell one or several apartments at a higher price, which will lead to an increase in the average price in the market.

In the case of housing shortage in the market, in conditions of free competition, due to poor information (for example poor MLS system), purchases can be accidental and prices will grow with a delay, since the first apartments can also be purchased by low-income

households. Bidding may take place in the case of the last apartment or apartments, which eventually triggers an increase in home price, since higher-income households are able to outbid the rest. In the case of discriminating monopoly, there is a higher likelihood that he will match prices to incomes already at the beginning on the basis of the information about the client, causing an increase in prices (Figure 10, right).

These considerations lead us to the next conclusion that in the residential housing market with a discriminating monopoly, both asking and transaction prices will be much more responsive to demand than in the case of free competition and traditional monopoly.

The described behaviour can be verified by using the example of the Warsaw real estate market in the recent years. It is worth noting that in Poland there is both a limited market transparency and a high concentration of production, and that historically these factors used to have an even greater influence than now. The available statistics (demand for loans, first prices of apartments, apartments put on the market, surplus of apartments, price structure, asking and transaction prices) let us look at how the Warsaw market functions in practice (see data in NBP 2013). In the boom period the strategy was relatively simple – firms raised prices as high as they could and fuelled the purchasing fever. This strategy can most easily be compared to the classic monopoly, with one difference, that the firms did not have to restrict supply at high prices, since demand, fuelled by speculation, was rising all the time. Asking prices were similar to transaction prices, and also the standard deviation of asking prices was smaller (smaller scale of price discrimination). During the collapse of demand in 2009, the classical monopolistic strategy was formally applied involving price increases. However, the reality was much more complex, since asking prices fell and their differentiation increased. Therefore, a discriminating monopoly mechanism was applied. The growth in supply of housing in 2011 and the situation heading in the direction of strong competition caused a fall in price level and a small decline in the scale of price differentiation. Summarising, we can state that in practice developers applied the discriminating monopoly approach as their dominant strategy and to a much lesser degree, the classical approach, which confirms our theoretical predictions.

Let us consider, therefore, with the use of the results of our analysis, how the real estate developer sector will function admits changes in market demand. Figure 11a shows the behaviour of the sector in conditions of a positive demand shock.

Figure 11a Demand shock   Figure 11b Demand shock with various price ealsticities
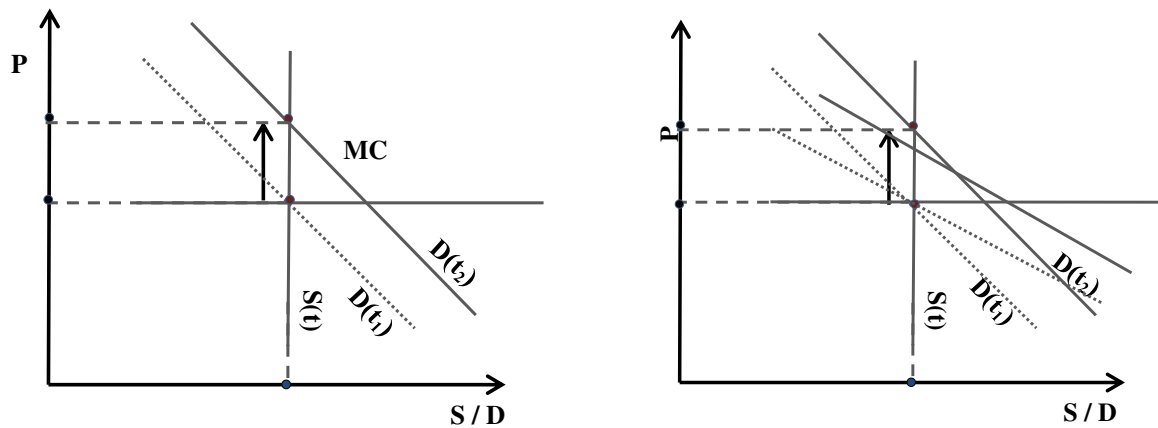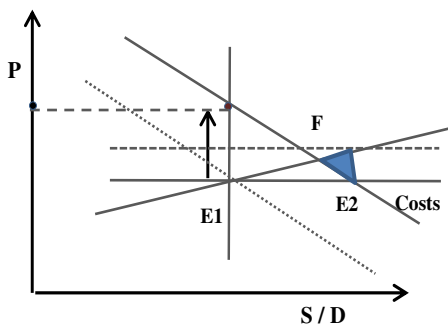
Figure 11c Effect of excessive supply due to an increase in demand

A consequence of the demand shock with rigid supply will be an increase in the price of smaller apartments, larger apartments, or the whole offer, depending on the proportions of the factors connected with the increase in incomes and the size of the population (Łaszek 2013). As we have described, developers who have contact with clients quickly raise the asking price, assuming later negotiations and price elasticity. At the same time, they also increase production, assuming a flat marginal cost curve, depending on how flat the demand curve is (Figure 11b). The effect of the demand shock can be passed onto planned apartment production with a multiplier effect (Figure 11c, production levels E1 and E2 respectively), which increases variability of supply in the primary market. The increase in demand for production factors leads to an increase in construction and assembly costs which is not foreseen by the developer (Figure 11c). However, the price discrimination strategy is so successful in generating profits that even a significant increase in costs does not lead to losses in the sector. On figure 11c only units built between points F and E3 incur losses and as one can clearly notice, this is amply covered by additional profits. Such a phenomenon in the form of too expensively built and overvalued apartments lingering on the market was observed in Poland's large cities between 2012–2013. If the developers had known the actual cost curve, they would have halted production at the level F. It can be seen graphically (Figure 11c) that the sector acting as competition of discriminating monopolies is resistant to losses, which has been actually observed in the Warsaw market, where the described scenario took place. The

main threat to the sector is the activation of the mechanism of free competition and a fall and standardisation of prices. Such a situation could take place when there is a large surplus of apartments in the market and developers compete fiercely for clients with prices and, at the same time, conduct intense marketing, which facilitates a comparison of offers. Depending on the moment of the "shift of the market" from a discriminating monopoly to free competition, the losses of the sector could be severe.

4. Summary

The analysis of the real estate developer sector requires the identification of the actual functioning of this sector. Unlike the majority of production firms, the developer generates a highly diversified (in terms of location and quality) good, which allows him to operate amidst a price discriminating monopoly. He offers clients very similar apartments in terms of production costs at different prices, thanks to which he may obtain higher profits than would be obtained in the case of free competition. However, the developer does not take into account the growing competition, which causes, on the one hand, the loss of his price discrimination power, and on the other hand, a rise in his construction costs. Taking into account these factors helps us to better understand the formation of bubbles in the real estate market.

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