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**Land Acquisition in Development Projects:
Investment Value and Risk**

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Land Acquisition in Development Projects: Investment Value and Risk

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Abstract

The aim of the article is to discuss the main problems in land-development activity. The study focuses on land acquisition problem. In the article we describe possible implications of difference between real estate market and investment value, and enumerate major sources of investment risk.

Key words

land assembly, development, costs, risk, investment value

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1. Introduction and background

House price appreciation in Europe has been very strong recently. With some exceptions residential prices increased in all European countries, but the growth effect was probably the most visible in emerging real estate markets of CE countries. The data suggest that in last two years Poland witnessed the biggest house price appreciation from all new EU members [RICS European Housing Review 2007].

Demand-driven boom was also observed on Polish land market. Land prices in major cities in Poland has been increasing significantly in Poland during recent three years. There are some obvious reasons for the fact:

Demand for land is in first place driven by structurally strong housing demand (low interest rates, demographic wave), and improving macroeconomic perspectives and expectations.

There are many institutional investors (i.e. investment funds), and considerable number of foreign investors (both individual and institutional – developers, investment funds, insurance companies) that are active players on green/brown field land market in Poland.

On the supply side, it should be noted that supply of land suitable for development in Poland is rather weak, and inelastic. The stock of premium sites – well situated, and ready for development – is short, and diminishing rapidly. There are also typical problems, that are present in nearly all post-socialist countries. These are: bureaucracy, complicated procedures, non-transparency and corruption. There is also shortage of master plans, especially in rapidly growing cities, which makes the investment process longer (in some cases gaining all permits can last for say, 3-4 years) more risky (it is harder to predict the exact result of bureaucratic procedure).

In the paper we focus on land acquisition problem, as we consider this phase of development project crucial for overall investment outcome, and to certain extent its aggregated results fundamental for real estate market dynamics. There are several arguments that support the proposition above. Firstly, even on emerging markets, the stock of greenfields suitable for development is systematically decreasing, as well as the number of large, superbly located plots. Therefore, every developer faces the land acquisition problem, which can be especially complicated when several small plots need to be assembled in order to start development. Secondly, as the building costs are hard to control, and demand is exogenous, land acquisition costs are the key variable when assessing investment yield.

The paper exploits the structure of transactions micro-data from Krakow to identify the potential large volatility of prices paid for adjacent plots, assembled for development projects. The potential large deviation could be surprising because neighborhooding plots share most of key attributes that determine their market value. Nevertheless, as we shall see though, there is enough of both theoretical and empirical evidence explaining this counter-intuitive result. In the end we shall discuss reasons, and consequences of potential gap between prices of land and their underlying investment value.

The paper is structured as follows. In Section 2 we perform scrutiny of literature on the subject of land prices determinants, investment value, and market efficiency. Later we present a theoretical model of land assembly process, and comment on current situation on land suitable for development market in Poland in section 3. Next several testable predictions are derived, to be examined in empirical part of the article. In Section 4 we discuss data sources, and finally present the most important results of the study. Conclusions and some remarks about possible future research are derived in Section 5.

2. Theoretical model of adjacent land assembly

Concepts of value and price has been discussed throughout real estate literature since decades. Recently, especially the problem of “speculative bubbles” – systematic cycle driven deviations of real estate prices from their fundamental value – is researched.

In our research of land assembly, we focus on other reasons why prices spectacularly deviate from their market values. First we present a classical model, as a key to the problem.

Although, rather omitted in the real estate literature, the problem of land supply was an object of several studies conducted on mature markets in Western Europe. Our study was inspired in certain extent, by a theoretical model of land assembly process proposed by Evans (2004), who adopted the diagram used by Munch (1976) in her analysis of the economics of eminent domain. This rather simple model is presented for the convenience of a reader in figure 1.

The costs of acquisition are shown on vertical axis (P), and quantity of land assembled on the horizontal axis (Q). As can be seen from the figure there are four curves used to predict the outcomes of the process: marginal value product (MVP), two marginal cost curves for assembly process A and B (MC_A and MC_B respectively) and market value horizontal curve (MV) used as a reference line.

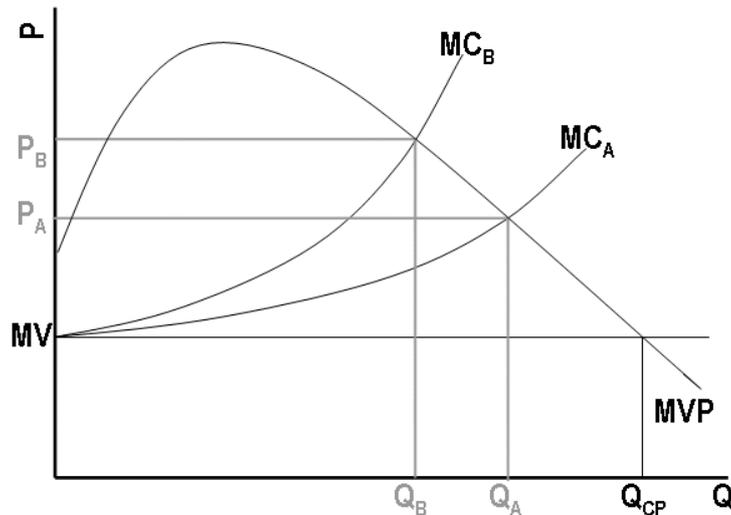


Figure 1. Land assembly economic model

Source: A. Evans, *Economics, Real Estate and the Supply of Land*, Blackwell Publishing, Oxford 2004, p. 193

From the figure above, it can be seen that MVP curve slopes upwards when assembling more land is economies of scale. The similar logic can be applied, when the marginal value starts to decrease from certain point due to diseconomies of scale. The model suggests that, a developer stops assembly process, when marginal value products equals the marginal costs of land involved. The costs of land acquisition can be family of possible MC curves. The basic situation is when marginal cost are equal to market value of land (horizontal MV line) – this applies to efficient markets in the long run. Alas, developers usually invest in shorter periods of time, they face the problem of increasing marginal cost of land assembly. Theoretical predictions are quit obvious - MC curve is steeper when the ownership is fragmented, plots small, and developer has little time to spare (as land owners realize that assembly process is being conducted they tend to escalate their reservation prices – especially when their plot is crucial for the entire project). As can be seen from MC_A and MC_B curves examination, costs quickly excess marginal value product, making further assembly unprofitable – and decreasing total area of development project (from Q_{CP} to Q_A or Q_B respectively). Real life examples can be easily found – large land development projects are costly, and very hard to conduct, unless some public assistance is provided, along with compulsory purchase involved - as often happens in case of road investments).

The theory indicates, that in land development activity transaction prices are strictly related to investment value of single plot in terms of whole development project, rather than market value. The more important the piece of land is for whole endeavor the higher the price, it would probably be transacted at (the reason why developers tend to conceal their assembly operations).

According to previously conducted research and theory-based predictions there are several potential barriers to land assembly. The major, that occur in most of the studies include: risky negotiations, legal problems, small sizes of irregular plots.

The most fundamental problem of every investor when conducting a real estate transaction is making the second party interested. The problem occurs, when land owner is uninterested/unwilling to sell. Private property owners have their own objectives, which are sometimes hard to understand. Many of this objectives, have nothing to do with economic goals – for instance, they can be psychological or sentimental based (notably the best illustrations are given by literature¹).

Second problem is strongly connected to ownership. When examining land plots, it often occurs that land titles are fractured. This means that small plots ownership rights belong to different owners. Sometimes one plot is co-owned by multiple persons. The other problem related is absentee owners. Sometimes problems are caused by title issues, especially in emerging markets, where legal title protection is considerably poorer then in developed economies.

¹ Probably the most famous example is provided by Anton Chekhov's last play "*The Cherry Orchard*", which concerns an aristocratic Russian woman and her family as they return to the family's estate (which includes a large and well-known cherry orchard) just before it is auctioned to pay the mortgage.

Empirical results suggest that prices of land depend of land plot size. Most of studies indicate that the relation is negative – the larger the site, the less expensive (per sq m) it is for potential buyer, other key variables controlled. Bitner-Fiałowska (2002) suggest that relation can be described by exponential curve. The other issue researched in her PhD thesis is a shape of typical plot. Statistical research conducted in several European cities and towns shows that average plot is of lengthy rectangle shape. As shown in our study, this can result in several problems when dealing with assembly operations.

In the end, it should be noted, that there are few empirical studies devoted to land supply, and land prices in emerging markets. From EU perspective – Central and East European countries seem to be of a special interest.

3. Land development projects – evidence from Poland

High (and possible increasing) sensitivity of investment budget on land acquisition costs – especially in favorable locations – is embodied into the nature of development activity. Land acquisition cost seems to become the key variable when assessing investment performance. From polish perspective, the procedure of turning land into development is complicated and long-lasting – in some cases it takes several years to complete. The outcome, in terms of costs involved is often hard to predict, *ex ante*.

The official data sources about land market in Poland are scarce, and highly aggregated. As most of statistical data they are seriously delayed. In table 1 we present some figures on land market in Poland.

Table 1. Key figures behind land suitable for development market in Poland in 2005

	<i>urban</i>	<i>rural</i>	<i>all</i>
Number of transactions	12760	11649	24409
Mean transaction value (zł)	140374	38799	91898
Mean transaction area (sq m)	1879	3168	2494
Mean transaction price (zł/sq m)	74,71	12,24	36,85

Source: Central Statistical Office in Poland

The land price depend on location. In the figure 2, we illustrate the land price behavior in all polish voivodships in 2005.

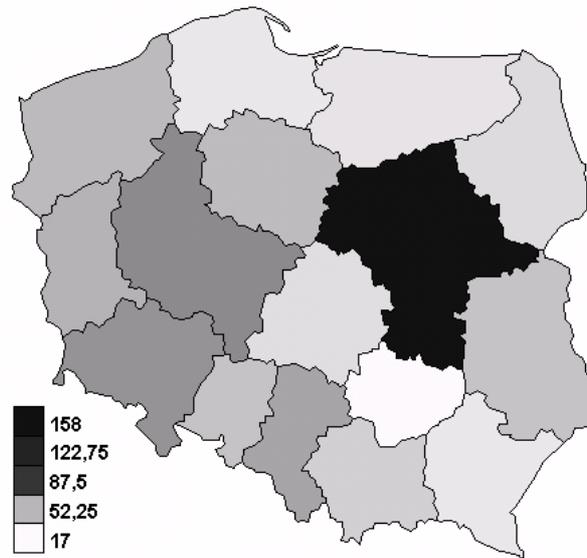


Figure 2. Land suitable for development prices in Poland in 2005
Source: Central Statistical Office in Poland

As can be seen from the figure 2, land prices differ substantially in Poland, even if we compare average land prices. For instance in Mazowieckie voivodship mean price in 2005 was 158,44 zł/sq m, while in Swietokrzyskie voivodship it was only 17,07 zł/sq m. The difference is even greater when we compare prices in favorable location in Warsaw, and prices in small towns in eastern Poland.

The other official statistics indicate that there was a huge gap between market value and replacement value of residential real estate in last two years. This explains the investment boom, and developers extraordinary yields.

High yields generated by housing development have some negative effects on real estate market in Poland. The most important consequences are:

- (i) occurrence of so-called „raw” developers: investors who lack expertise, or even fundamental knowledge indispensable to organize the whole process. Although there are no regular research on this phenomenon, the bulk of this new wave of developers are firms or individuals successful in other economic activities.
- (ii) illegal or half legal practices of some developers
- (iii) rising speculation over land suitable for development

These are the major outlines of the problems put in our study. In the end of this section, it should be noted, that land development is not an established profession on real estate market in Poland. There is a lack of specialized companies, and land-development activity in Poland is:

- (i) realized as a part of complex development activity
- (ii) realized by local government
- (iii) realized by individual land proprietors

Current market situation -rising prices of land, and converging developers yields in next two-three years perspective – put in favorable situation this investors, who amassed huge land banks. On the other hand the entry barriers for newcomers are as high as never.

4. Land acquisition process – evidence from Krakow

4.1 Data and scope of the study

The main objectives of the study, are listed below:

- (i) exploration of land assembly projects,
- (ii) exploration of land acquisition cost, and their key determinants.

In order to research areas above, the research was both quantitative and qualitative. The core of our researched is based on land transaction data provided by Cracow Real Estate Institute (KIN), and based on Notary Acts (NAs). The data were drawn from large database covering nearly all land transaction made in Krakow since 1992². Complementary to being representative, the data used in our research were also highly detailed – available information covered several plot attributes (i.e. size, length, width, transaction price, address, GIS coordinates, distance from the city centre, possible usage, territory development) and additional transaction records (i.e. buyer, seller, time, valuation results where possible, current user where existing, supplementary agreements as stated in NA). All KIN data records are based on Notary Acts information and in-depth site scrutiny (of physical cadastre, and other real estate registers available, GIS survey, etc.).

Our sample from real estate market in Krakow (632 observations) covered transaction from 4/10/1992 to 31/12/2003. Sampling was based on land contiguity. Only adjacent plots sold by individual proprietors to institutional investors were included in the sample. Majority of these plots was available for multi-housing or commercial development, and most of them has been built over (scrutiny of whether site assembled was developed was another measure we used to ensure face validity of our data).

In order to realize other research goals additional qualitative research was performed. In that faze we conducted several in-depth unstructured interviews with developers, and real estate brokers operating in Krakow area. Main areas of our interest were:

- the faze of site search (techniques used, objectives, preliminary evaluation, etc.);
- the process of land-acquisition (problems, negotiations, strategy, legal pitfalls);
- assessment of an investment worth (methods applied, the role of risk, etc.).

Qualitative research results helped us to evaluate the impact of land acquisition costs on the investment outcome (in terms of risk and yield). It should be noted however, that results of that faze, are probably non-representative and incomplete. Alas, they can provide some interesting hypotheses to be tested in further quantitative research.

Analysis of land transaction data, concerning possible plot assembly situation

4.2 Land acquisition problems

History of land-development transaction shows that some parts of the city have witnessed very intense assembly operations during last 15 years. Three of them, seem to dominate the others in terms of transactions conducted: Bronowice, and Krowodrza Górka in north-west part of the city, and Ruczaj in south-west part of the city. As can be seen from the map attached, the east part of the city (namely Nowa Huta district) was not essentially interesting for potential developers [fig. 3]. The statistics for housing development follow the same pattern, so the concentration of land-assembly practices is supposedly not caused by specific land patterns in west part of Krakow (small plots forcing developers to perform complicated assembly operations), but the potential investment benefits (housing attractiveness of west part of Krakow, contrasted with post-socialist and unsafe Nowa Huta).

² When compared to official real estate market statistics, based on NAs (provided by Central Statistical Office in Poland, KIN database covers about 97 per cent of land transactions in Krakow. This makes the database representative source of data about real estate market in Krakow.

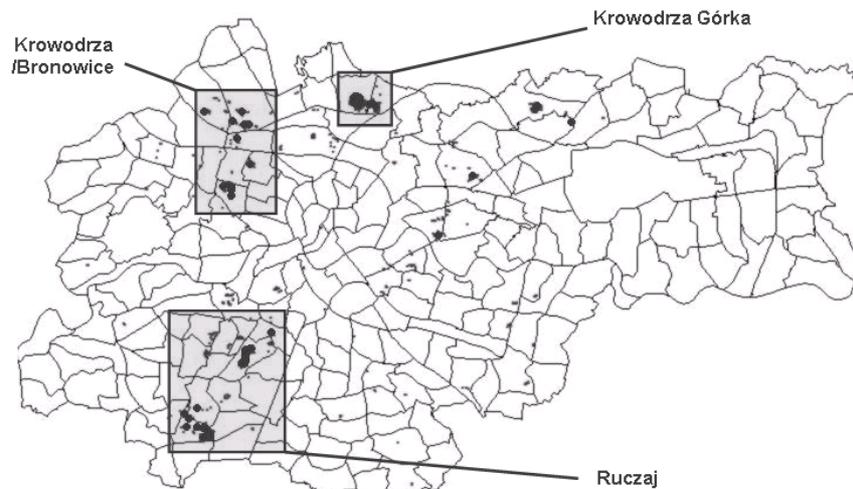


Figure 3. Selected land assembly operations in Krakow from 1993-2004

Source: author's own

During examined period of time, 116 land assembly operations were undertaken. This number does not include transaction conducted by municipality of Krakow and the Treasury of Poland, with the aid of compulsory purchase. The operation were not homogenous in terms of time span needed to complete the entire operation, number of transactions involved, and operation total worth. The main figures can be shown in table 2.

Table 2. Key figures about land assembly transactions in Krakow from 1992 to 2004

	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>Min</i>	<i>Max</i>
Land assembly time – in months	116	13,05	5	0	86
Number of transactions	116	5,54	4	2	40
Operation worth – in PLN	116	1946243	462683	9879	41370749

Source: Author's own based on KIN database

First conclusion drawn from our analysis is that assembly operation in Krakow, were rather small sized (74% of transaction involved less than 5 operation). The biggest operation involved 40 transactions. The majority of assembly projects were completed in one year time span (one in four operation took only several days). Only 20% of all operation took longer than 20 months. The last evidence of different scale of land assembly in Krakow is based on information of operation worth – it ranges from less than 10 thousand zł to as much as 41 mln zł.

As for the plots involved in each operation, suffice it to say that they varied considerably. Empirical evidence shows that typical plot in Krakow is long rather than wide (although there are exceptions). Minimum front width of plot from our sample was 1 meter only, and the maximum 615 meters. But as it can be seen from statistics available in table 3, dispersion of observations is huge, especially when plot area is considered.

Table 3. Key figures concerning plots involved in land assembly operations In Krakow from 1992 to 2004

	<i>N</i>	<i>Mean</i>	<i>Min</i>	<i>Max</i>	<i>Std.dev..</i>	<i>Std.dev-to-mean ratio</i>
area -in sq meters	632	3252,7	3,000	132820	7453	2,29
width (front) - in meters	632	33,8	1	615	53	1,55
length - in meters	632	93,7	4,5	604	96	1,02

Source: Author's own based on KIN database

More careful analysis shows also that a modal plot was small, and often of irregular shape. As can be seen from figure 4, when the simple shape ratio is used (front width to length of a plot) it occurs that most of land pieces assembled by developers were long rectangle shaped. This result is not surprising – as a matter of fact it is consistent with outcomes of previous research conducted by Bitner-Fialkowska in selected European cities (2002). When dealing with land transactions, a few words must be spoken about legal issues of assembly process. Significant number of plots had major legal disadvantages – hindered access to public road, easement appurtenants, and personal servitudes. Many plots were co-owned. All these defects made the future development a costly, and problematic endeavor.

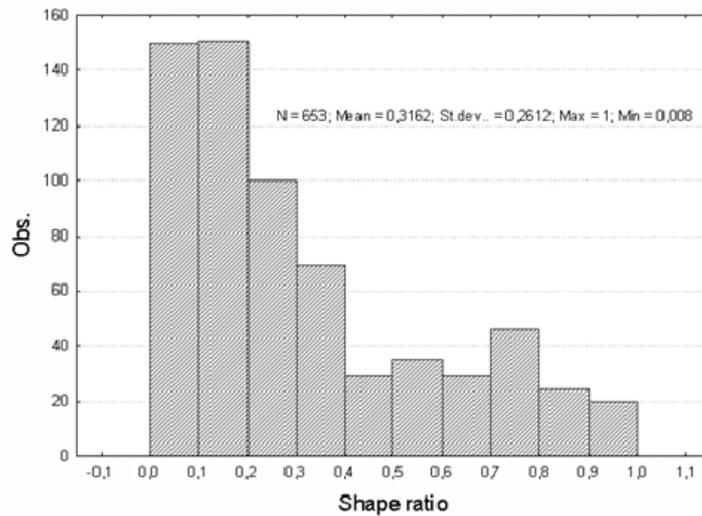


Figure 4. Transaction based evidence of typical shape ratio of land suitable for development in Krakow
 Source: author's own based on KIN database

More illustrative evidence of the statistics above is provided by figure 5.

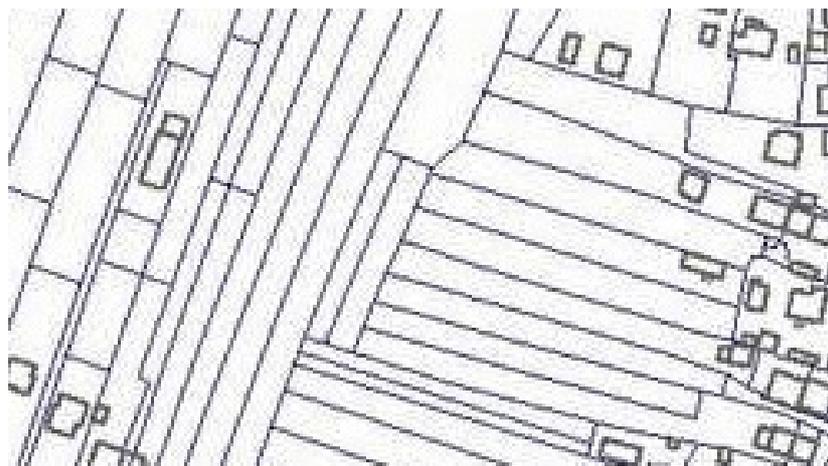


Figure 5. Typical land pattern of sprawling city - the evidence from Krakow
 Source: physical cadastre map of Pasternik in Krakow,
http://www.bip.krakow.pl/?dok_id=13033&sub_dok_id=13033

The long, narrow rectangular plots are good for agriculture, but seriously disadvantageous when development projects are concerned. The land pattern displayed in figure 5 forces developers to assemble several plots from

different owners in order to conclude large development projects. The consequences are discussed in the next section of the paper.

4.3 Land acquisition costs and risk

From all land assembly operations in our sample, considerable number of 34 was accomplished within few days period (most of this number in one day). These were drawn out of the sample and examined separately.

To examine acquisition costs we performed scrutiny of each land assembly operation. In order to find more generalized pattern of price movement we studied **relation** between **prices** of land pieces gathered in each project (we set the price of first transaction accomplished during the whole process to 100) and the **time** from the start of the entire operation (in months). The results illustrated by scatterplot can be seen on figure 6.

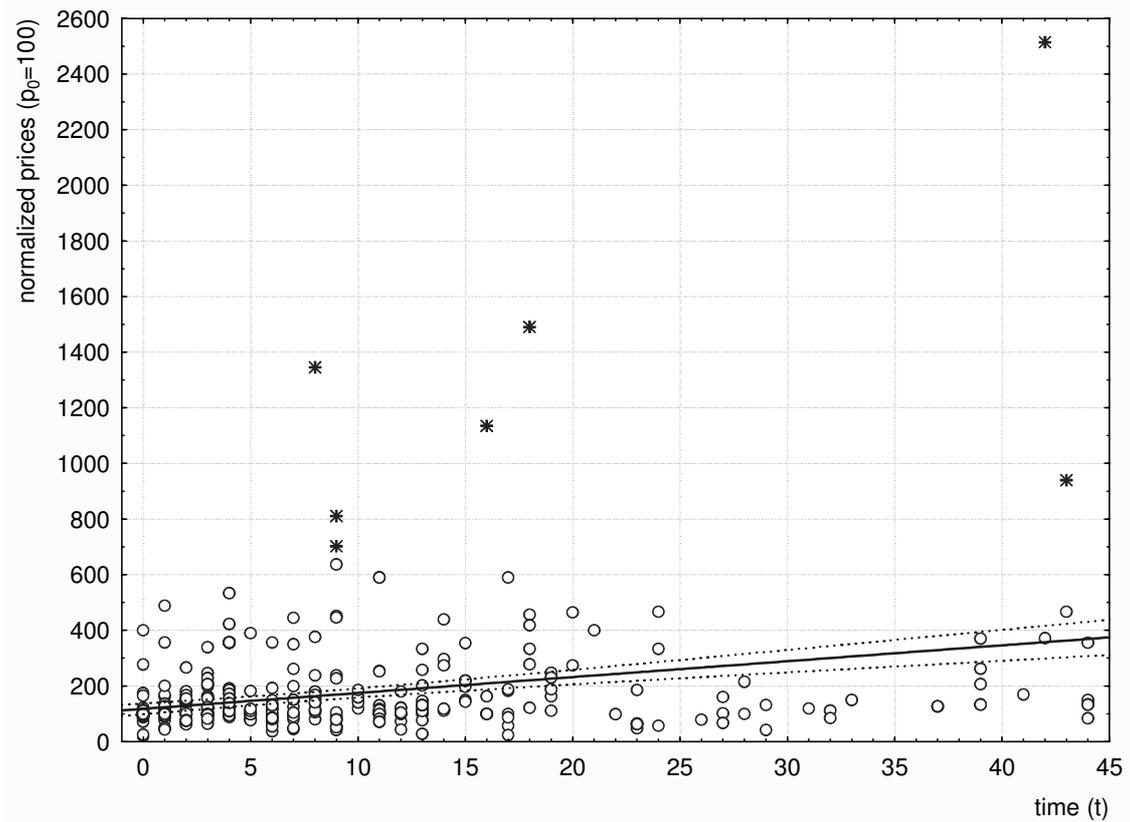


Figure 6. Land prices in land assembly project in Krakow

Source: author's own based on KIN database

As can be seen from illustration above, there is no apparent abnormal appreciation process when transaction prices are concerned. This empirical result is somewhat surprising, when compared to theoretical prediction of marginal cost movement expressed in figure 1.

As we do not aspire to build the competing model of a land assembly process, there were several interesting effects observed. Although the research was exploratory we believe that the results obtained have substantial descriptive value. Several facts we have detected are listed and discussed below:

- In many operations investor faced the legal situation where there were several co-proprietors of a single plot. Empirical evidence shows, that in most of assembly operations in Krakow shares were sold simultaneously. It seems that a kind of the “*either all or none strategy*” was applied. Of course there were also (as always) interesting exceptions. When several shares and/or plots were sold simultaneously, the prices per sq meter were similar – and often exactly the same. Descriptive statistics show that prices are concentrated around the mean - the standard deviation to mean ratio of 34 simultaneous acquisition projects from our sample was only 0,24, with kurtosis of 18.

- In some projects the “*step by step strategy*” of land assembly was observed. It was typical for several big assembly projects, that usually were conducted in distinct fazes - when certain number of plots were acquired, there were built over, and investor began negotiations with owners of adjacent plots. If the result was positive, the area of development was enlarged at comparatively lower cost (all necessary infrastructure existing, benefits of operation scale, etc.);
- In many operations prices per sq meter related to prices of first piece of land sold. This particular effect can be attributed to imperfect market data and strong asymmetry of information (especially on supply side). We called these effects „*regression to mean*” and “*chaining*” pricing strategy, as sellers relied heavily on information about average price paid for plots in neighborhood (without taking into account different site attributes), and tend to account for time when setting the asking price, which were on a slightly higher level than plots sold before (their reservation prices usually equaled the price of those previously sold). Surprising enough – when compared to theoretical expectations - appreciation in most of cases was mediocre (and generally followed market trends in Krakow).
- As can be seen from figure 6 land assembly cost were volatile (increasing investment risk). Several observations deviated considerably from others. The result is rather intuitive, and discussed in previous studies³. These so-called “*costly outliers*” were usually plots, that were indispensable for entire development project to continue. The highest prices per sq meter were paid for tiny pieces of land stretching out in the middle of assembly area (of course when seller discovered the operation soon enough, and applied a successful negotiation technique), and for part of plot that supplied the whole investment area with access to public road (the same applied to easement appurtenants establishment).
- In case of large assembly operations, speculative behavior was observed. A number of important parcels were sold twice within short time span. This “*speculative buyout*” resulted in enormous land appreciation – usually more then 100% a year (in some cases even more spectacular). The result suggest that repeated-sales indices of price movement in Krakow can be seriously biased⁴.
- According to result of qualitative research some developers tend to choose plots not covered by precise master plans. Even though the risk is much higher (as use planning is an effect of bureaucratic procedure), they benefit from inefficient market with strong asymmetry of information, and count for extraordinary profits (the importance of secret/protected information connected to possible site development options – usually not available for individual sellers). In recent years, many developers amassed huge quantities of land suitable for development (land banks) with option to invest (and they wait for housing prices to go up even higher).

The last issue to be discussed here, is a consequences of new developments to urban landscape quality. As mentioned before only about 10% of Krakow’s area is covered by master plans. The effects are obvious, and can only be described as chaotic development. The developers invest where it is possible, and they excess potential gains by increasing the built-up area to maximum. Some of most valuable plots in city centre are built-up by substandard - in terms of architectural design – investments.

As development in Krakow is hampered by bureaucratic procedures, we can observe an increasing urban sprawl over surrounding villages. The case of Krakow resembles the situation observed in other rapidly growing cities in emerging real estate markets – Warsaw, Moscow, Bratislava. Many problems are caused by an inefficient road infrastructure – the embarrassing result of lack of strategic urban planning and foresight.

5. Conclusion

Findings

As indicated before, the paper is intended to fill the gap on the subject of the land supply from the perspective of development projects. Although discussion on land supply is present in real estate literature, it focuses merely on mature western markets. Little is known about land-development problems in emerging markets in CEE countries. In our study we focused on real estate market in Poland, and we examined land assembly operations in Krakow – one of most rapidly growing land markets in the region.

The empirical results are to some extent similar to previously conducted research in western Europe and US. Surprising enough we discovered that land acquisition cost appreciation during most of land assembly operations was not as high as we expected on the bases of theoretical models available in the literature. The prices of succeeding

³ see section 2 for details

⁴ a detailed discussion on methodology of index construction on emerging markets can be found in Bitner-Fiałkowska PhD thesis (2002)

land assembly transaction seemed to be rather chained to the first transaction price in the neighborhood (rather than fundamental market value of sites). On the other hand in many operations at least one deviant (in terms of enormous price paid) observation was noticed. We observed several speculative transactions that influenced the final outcome of land assembly operation. The other problems of land-assembly operations were connected to: legal issues, small sizes of separate plots, co-ownership of one piece of land, communication and access to public road burdens. Typical land assembly operation was rather small sized (few transactions involved), and quick (a modal of 0-6 month). According to qualitative research results, when investment value and market efficiency is concerned the emphasis must be put on land planning and information issues. The role of negotiations was also pointed out – several endeavors were accomplished in just one day, at cooperatively low cost (after negotiating with all land proprietors involved in one time).

Further research

Our research has a preliminary character, and is explorative in nature. It is still carried on. Many problems discovered are far from being resolved – most of which due to scarce, and non representative investment information from developers. Important fields of future research include the following:

- measurement of sensitivity of investment value on land assembly costs (via Monte Carlo simulations);
- evaluation the different strategies of land assembly on land acquisition process outcomes (in paradigm of game approach theory).

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