NBP Narodowy Bank Polski

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Hedonic analysis of office and retail rents and transaction prices in Poland – data sources, methodology and empirical results

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Overview of the paper

- The commercial real estate survey
- Empirical applications:
  - Hedonic analysis of office rents in Warsaw
  - Hedonic analysis of retail rents in Poznań
  - Mean and hedonic transaction prices of office and retail buildings in Poland
  - Analysis of the profitability of office investment in the Warsaw market under various mortgage cost and vacancy rate scenarios

The commercial real estate survey (1)

- The commercial real estate survey was introduced on a mandatory base into the Statistical survey program of official statistics in 2013 and is supervised by the Governor of the Narodowy Bank Polski.
- The construction of the survey and how it is carried out is based on the survey of the residential real estate market that was introduced by the Narodowy Bank Polski (NBP, henceforth) in voluntary form in 2006 and in mandatory form in 2013, and which is described in Widłak and Łaszek (2008) and Widłak and Tomczyk (2010).
- All data that is collected underlies the Law on Official Statistics, which guarantees its safety.
- More information can be found here: http://bip.stat.gov.pl/en/statistical-survey-program-24/.
- The original survey sheets can be found here: http://www.nbp.pl/home.aspx?f=/publikacje/rynek_nieruchomosci/ankieta.html

The commercial real estate survey (2)

- The survey is conducted by trained analysts of the local branches of the NBP.
- Owners of commercial property, brokers, administrators and advisory firms active in the commercial real estate market are obliged to fill out the survey on a semiannual basis.
- Offers are collected as of 30th June and 31th December, while transactions which appeared in the whole previous half year are collected.
- The survey is conducted between 1st and 20th of March for the half year that ends in December and between 1st and 20th of September for the half year that ends in June.
- The analysts of the local branches of the NBP need around two months to clean the data and analyse it.

The commercial real estate survey (3)

- The collected data includes prices, rents and rental or price-building attributes of commercial space and/or commercial properties.
- The survey for each type of property (office, retail and industrial) has its own set of information, but all surveys share the same design.
- The survey for each property type has two sheets, the first covers the building, while the second covers rents and rent related attributes.
- The information about the building contains its address, the total leasable area, number of storeys, the year of the construction, the technical condition of the building, the unleased space, the share of common space, the number of parking places, the type of the building, the number of single premises, operational costs, information about the purchase/sale transaction as well as the information about the last valuation of the building, etc.
- Some variables are collected only for given property types, for example the number of shops in the retail property survey, or the minimal rental unit in case of industrial property.
- The second page contains detailed information about the rented premises, such as their size, location in the building (for office and retail buildings) and information about the rental contract (its start, duration, etc.).
- The full list of collected variables, their description and information for which market segment those variables are collected is presented in tabular form in the Appendix.

The commercial real estate survey (4)

- Data for the following types of commercial property is collected:
- Office real estate - office space located only in office buildings, with an leasable area of at least 50 m2
- Retail space:
  - being part of large retail properties located in the agglomeration of the voivodeship capital city, with an area of at least 100 m2 each
  - commercial and service facilities located in office buildings, with an area of at least 50 m2 each
- Warehouses – space in warehouses located in places that constitute storage centers of the voivodships.

The commercial real estate survey (5)

Figure A1 First page of the office survey, with data about the building and its price and valuation - example of the office sector survey

NARODOWY BANK POLSKI		
Name and address of the reporting unit	**NBP-NK/B** The survey for the office sector NBP-NK/B	NBP Regional Branch .....

Time needed to fill out the questionnaire		
Please enter the time (in minutes) needed to prepare the data	1	
Please enter the time (in minutes) needed to fill out the form	2	

NBP-NK/B 1 DATA FORM FOR SURVEYING THE COMMERCIAL REAL ESTATE MARKET - OFFICES

1	The respondent's number will be assigned by the NBP Regional Branch.

Office real estate - office spaces located only in office buildings - with an area no less than 50 m2

Location					Description of the building																						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
The number of the building	City	District	Street	Street nr.	The name of the building	Year of completion	Technical condition (after modernization, without modernization)	The year of the latest modernization	Total net rentable area (m2)	Net vacant space (m2)	Share of common areas in the gross lease area (%)	Number of parking spaces - underground	Number of parking spaces - above-ground	Number of overground storeys	Office class (A, B, C)	Share of retail and service area net%	Operating costs per month	Currency of the operating costs (PLN/EUR)	Transaction price of purchase / sale of the real estate (gross)	Currency of transaction price for buying / selling real estate (gross)	The date of the offer to sell the property	Date of purchase / sale of real estate	The value of the property resulting from the last valuation	Currency of the property value resulting from the last valuationy (PLN/EUR)	The capitalization rate resulting from the last valuation (%)	The day on which the last valuation was made	Green building (YES / NO)	COMMENTS
i1																												
i2																												
i3																												
itd.																												

The commercial real estate survey (6)

Figure A2 Second page of the office survey, with data about the rents and attributes of single premises in the building described on the first page

Office real estate - RENTS															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
The number of the building from form NBP-NK office 1	No. of the leased area	Floor	The type of service offered by the tenant of office space	The business sector of the renter of the retail space	The size of each area rented / for rent (m2)	Fees related to the operation and maintenance of space per sqm in a month	Currency of exploitation fees and maintenance of space per sqm. per month (PLN / EUR)	Net rent applicable on the day of quotation / offered per m2 in a month	Currency (PLN / EUR)	Lease terms - contract length (years)	Lease terms - length of the period free of rent (months)	Date of issuing the lease offer (DD-MM-YYYY)	Date of the lease transaction (DD-MM-YYYY)	Valorisation of the rent (yes, no)	Area status (rented, for rent)

Hedonic analysis of office rents in Warsaw

Table 1. Results of the estimation of log office space rents in euro per m2 per month in Warsaw

variable	coefficient	standard error	statistical significance
office class B	-0,268519	0,0348060	***
office class C	-0,405917	0,0572861	***
ln age plus 2	-0,0334447	0,0151385	**
ln distance from the center	-0,107016	0,0164691	***
ln total leasable area	0,00637991	0,0150051	
constant	3,76011	0,182586	***

The regression was run with OLS, using 152 observations, the R2 is 70%.

Source: NBP

Hedonic analysis of office rents in Poznań

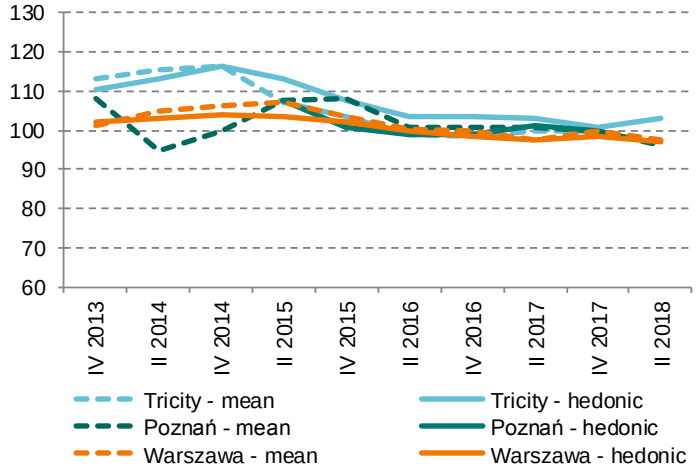
Table 2. Results of the estimation of log retail space rents in euro per m2 per month in Poznań

variable	coefficient	standard error	statistical significance
const	2,96643	0,253102	***
Log_parkingspace	0,107218	0,0248292	***
Log_leasing space	-0,346554	0,0184646	***
Log_number of shops	0,220312	0,0278825	***
Log_age of the building	0,0875909	0,0362018	***
top_shopping center	0,159862	0,0518214	***

The regression was run with OLS, using 681 observations, the R2 is 41%.
Source: NBP

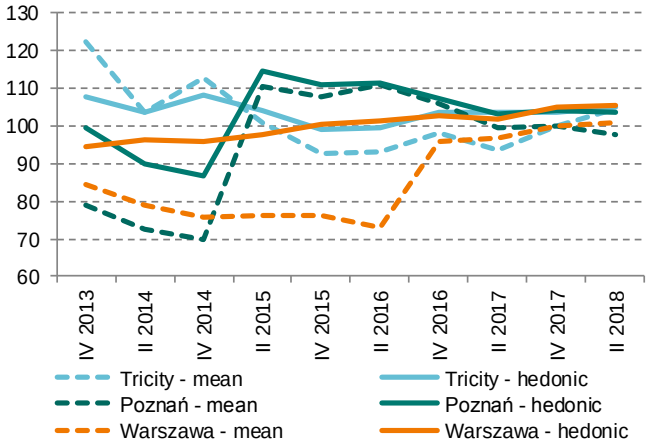
Rent index in the office and retail sector in Warsaw, Poznań and Tricity

Figure 1 Index of rents for offices, average and hedonic (2017 IV = 100)



Source: NBP

Figure 2 Index of rents for shopping centres, average and hedonic (2017 IV = 100)



Source: NBP

Mean and hedonic transaction prices of office and retail buildings in Poland (1)

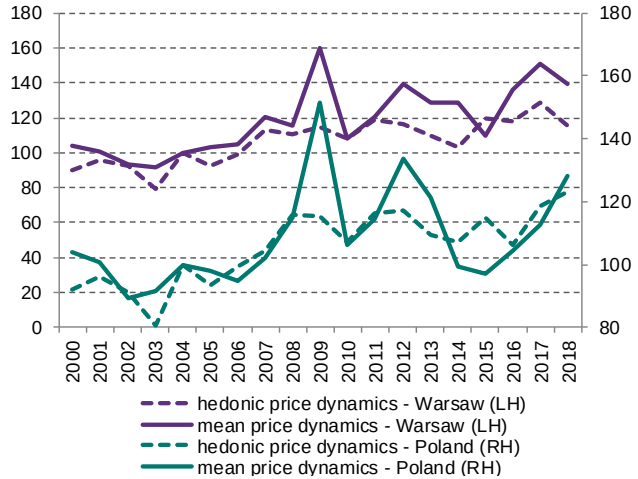
Table 3. Results of the estimation of log transaction price per m2 for office buildings in Warsaw and retail buildings in Poland

Offices				Retail buildings			
	coef.	std. Err.	p-value		coef.	std. Err.	p-v
ln_leasable_area	0.001	0.027	0.98	**ln_leasable_area**	-0.051	0.062	
office_class_A	0.173	0.055	0.00	**large_agglomeration**	0.050	0.068	
ln_age_plus_2	-0.115	0.030	0.00	**prime_property**	0.679	0.168	
ln_distance	-0.134	0.025	0.00	**retail_park**	-0.260	0.141	
prime_property	0.375	0.080	0.00	**ln_nr_shops**	0.092	0.052	
d2000	-0.108	0.160	0.50	**ln_number_levels**	0.142	0.060	
d2001	-0.044	0.172	0.80	**ln_age_plus_2**	-0.051	0.042	
d2002	-0.077	0.159	0.63	**d2002**	-0.162	0.278	
d2003	-0.235	0.153	0.13	**d2003**	-0.212	0.304	
d2005	-0.074	0.120	0.54	**d2005**	-0.030	0.221	
d2006	-0.008	0.120	0.95	**d2006**	0.164	0.217	
d2007	0.122	0.123	0.32	**d2007**	0.214	0.222	
d2008	0.099	0.133	0.46	**d2008**	0.471	0.236	
d2009	0.140	0.223	0.53	**d2009**	0.391	0.243	
d2010	0.077	0.131	0.55	**d2010**	0.149	0.228	
d2011	0.170	0.125	0.17	**d2011**	0.153	0.216	
d2012	0.153	0.131	0.24	**d2012**	0.328	0.241	
d2013	0.091	0.124	0.46	**d2013**	0.462	0.215	
d2014	0.030	0.141	0.83	**d2014**	0.253	0.241	
d2015	0.180	0.147	0.22	**d2015**	0.422	0.216	
d2016	0.168	0.145	0.25	**d2016**	0.229	0.243	
d2017	0.250	0.162	0.13	**d2017**	0.351	0.239	
d2018	0.143	0.134	0.29	**d2018**	0.194	0.384	
cons	9.060	0.371	0.00	**cons**	7.447	0.507	

Source: NBP

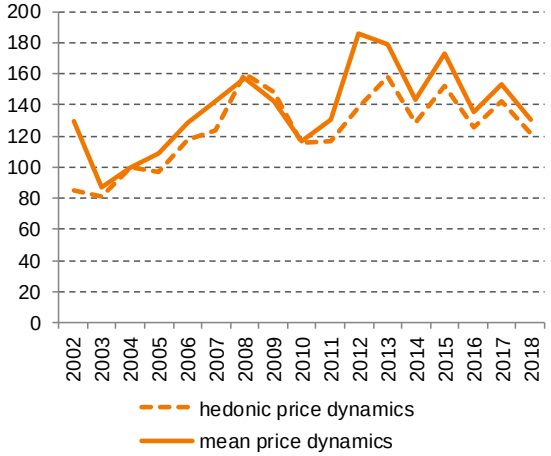
Mean and hedonic transaction prices of office and retail buildings in Poland (2)

Figure 3 Mean and hedonic price index for office properties in Warsaw and Poland (2004=100)



Source: NBP

Figure 4 Mean and hedonic price index for retail properties in Poland (2004=100)



Source: NBP

Analysis of the profitability of office investment in the Tricity market under various mortgage cost and vacancy rate scenarios (1)

Table 3. Economic results (in euro), assuming a 2.5% interest rate on the loan and a 5% vacancy rate.

year	EBITDA	net profit	FCFE	DSTI
1	2 186 401	460 695	597 033	0.71
2	2 197 333	485 941	602 043	0.71
3	2 237 445	535 237	630 592	0.70
4	2 277 497	584 909	658 993	0.69
5	2 315 838	633 629	685 906	0.68
6	2 354 681	683 202	713 121	0.68
7	2 394 146	733 735	740 732	0.67
8	2 434 242	785 248	768 745	0.66
9	2 474 979	837 761	797 164	0.65
10	2 516 369	891 294	825 997	0.64
11	2 558 420	945 869	855 247	0.63
12	2 601 145	1 001 507	884 920	0.63
13	2 644 553	1 058 229	915 023	0.62
14	2 688 655	1 116 057	945 561	0.61
15	2 733 463	1 175 015	976 539	0.60
…				

*/first year where the mortgage is fully paid back

Source: own calculations.

Analysis of the profitability of office investment in the Tricity market under various mortgage cost and vacancy rate scenarios (2)

Table 4. The profitability of the office building's activity measured by NPV and IRR with the assumption of 2.5% of the loan interest rate and 5% of the vacancy rate

IRR (for the equity of the investor at the initial date of the investment)	**9.46%**
NPV (discounted value of the future cash flows, after considering the investment expenditure and the residual value.)	4 957 566 euro
Residual value (cash flow in the 26th year/ discount rate)	40 457 986 euro
Discount rate	7.0%

Source: own calculations.

Analysis of the profitability of office investment in the Tricity market under various mortgage cost and vacancy rate scenarios (3)

Table 7. Analysis of the sensitivity to the increase in interest rates on loans and the vacancy rate and the decrease in the net rent rate (base values: 2.5% interest on the loan, 5% vacancy rate, 13 euro / sq m / m-c rent).

Category	Change	IRR	NPV (euro)	DSTI*	ROE*
Mortgage cost	0%	9.46%	4 957 566	0.71	5.1%
	+0.5 p.p.	9.09%	4 245 257	0.74	4.6%
	+1.0 p.p.	8.72%	3 508 725	0.78	4.0%
	+1.5 p.p.	8.34%	2 748 435	0.81	3.5%
	+2.0 p.p.	7.95%	1 964 914	0.84	2.9%
	+2.5 p.p.	7.56%	1 158 738	0.87	2.4%
	+3.0 p.p.	7.16%	330 534	0.91	1.7%
Vaccancy rate	0%	9.46%	4 957 566	0.71	5.1%
	+5%	8.49%	2 966 278	0.76	4.0%
	+10%	7.50%	974 990	0.81	3.0%
	+15%	6.47%	-1 016 298	0.87	1.9%
Net rent	0%	9.46%	4 957 566	0.71	5.1%
	-0.5 euro/m2/month	8.89%	3 790 628	0.74	4.5%
	-1.0 euro/m2/month	8.32%	2 623 691	0.77	3.8%
	-1.5 euro/m2/month	7.74%	1 456 753	0.80	3.2%
	-2.0 euro/m2/month	7.15%	289 815	0.83	2.6%
	-2.5 euro/m2/month	6.54%	-877 122	0.86	2.0%

*/ *value calculated at the time the mortgage was taken*

Source: own calculations.

Conclusions

- This paper explains how the NBP conducts the survey about rents and transaction prices of commercial property (office, retail and industrial buildings) and shows how the data is used to get more insight about the market.
- The construction of a hedonic rent index and a hedonic transaction price index is presented.
- Finally, we show how the information can be used to get insight about the situation in the market, by calculating the profitability of an office investment. A simple stress test is applied to show how the rate of return and other economic indicators change when mortgage costs or the vacancy rate increases.