



Urban and real estate economics

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Urban and real estate economics

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Week 6

Spatial patterns of cities II

Even location

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1. Retail location patterns

Stock building model

u : units of goods consumed annually

P : purchase price per unit

i : storage cost per year (foregone interest incl.)

k : transport cost per purchase trip

v : frequency of trips per year

Q : quantity purchased per trip

where $u = vQ$

Stock building model

- Average stock quantity:

$$Q/2 = u / 2 / v$$

- Total purchase value of stock stored:

$$Pu / 2 / v$$

- Total annual cost of consuming u units of goods:

$$CC = Pu + kv + i (Pu / 2 / v)$$

The consumer decides on the quantity of purchase.

Stock building model

- The optimal frequency of shopping trips:

$$v = \left(\frac{iPu}{2k} \right)^{\frac{1}{2}}$$

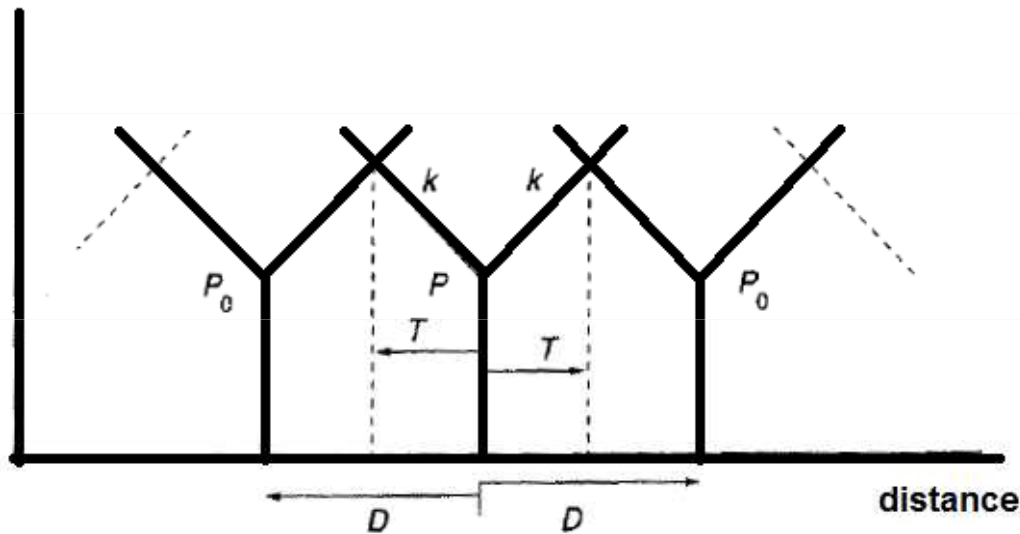
- Buying more units of goods per year will lead to more frequent shopping trips.
- Perishable goods that are more difficult to store are purchased more often.

A model of retail competition

- Consumers are located evenly along a line at a uniform density of F households per distance unit.
- Stores are located along this line at even intervals of distance D .
- The retailer can set the price of a particular item at P , while knowing that for the same item its competitors charge a price P_0 .
- The marginal cost of selling the item is mc , while the fixed cost of selling the same item is C .
- Let T denote the market area boundary of a shop.
- Let S denote the annual number of items sold.

A model of retail competition

consumer's
delivered price



Retail market areas
(Uniform buyer
density)

Shops are located
at even intervals of
distance D .

Let T denote
the market area
boundary of a shop.

A model of retail competition (cont.)

$P + kT = P_0 + k(D - T)$ implies

$$T = (P_0 - P + kD) / (2k)$$

Annual sales per shop:

$$S = 2TvF = vF(P_0 - P + kD) / k$$

A higher price raises unit profits but reduces the market area and hence unit sales.

$$\pi = (P - mc)vF \frac{P_0 - P + kD}{k} - C$$

The optimal price: $P = \frac{P_0 + kD + mc}{2}$

A model of retail competition

Shops are identical, eventually in equilibrium everyone's price will be the same:

$$P = kD + mc$$

$$T = D / 2$$

$$S = DvF$$

In the long run, stores will enter and exit the market until the profits earned equal zero.

$$(P - mc) vFD - C = 0$$

A model of retail competition

- The previous two equations with two unknowns give the equilibrium solution below:

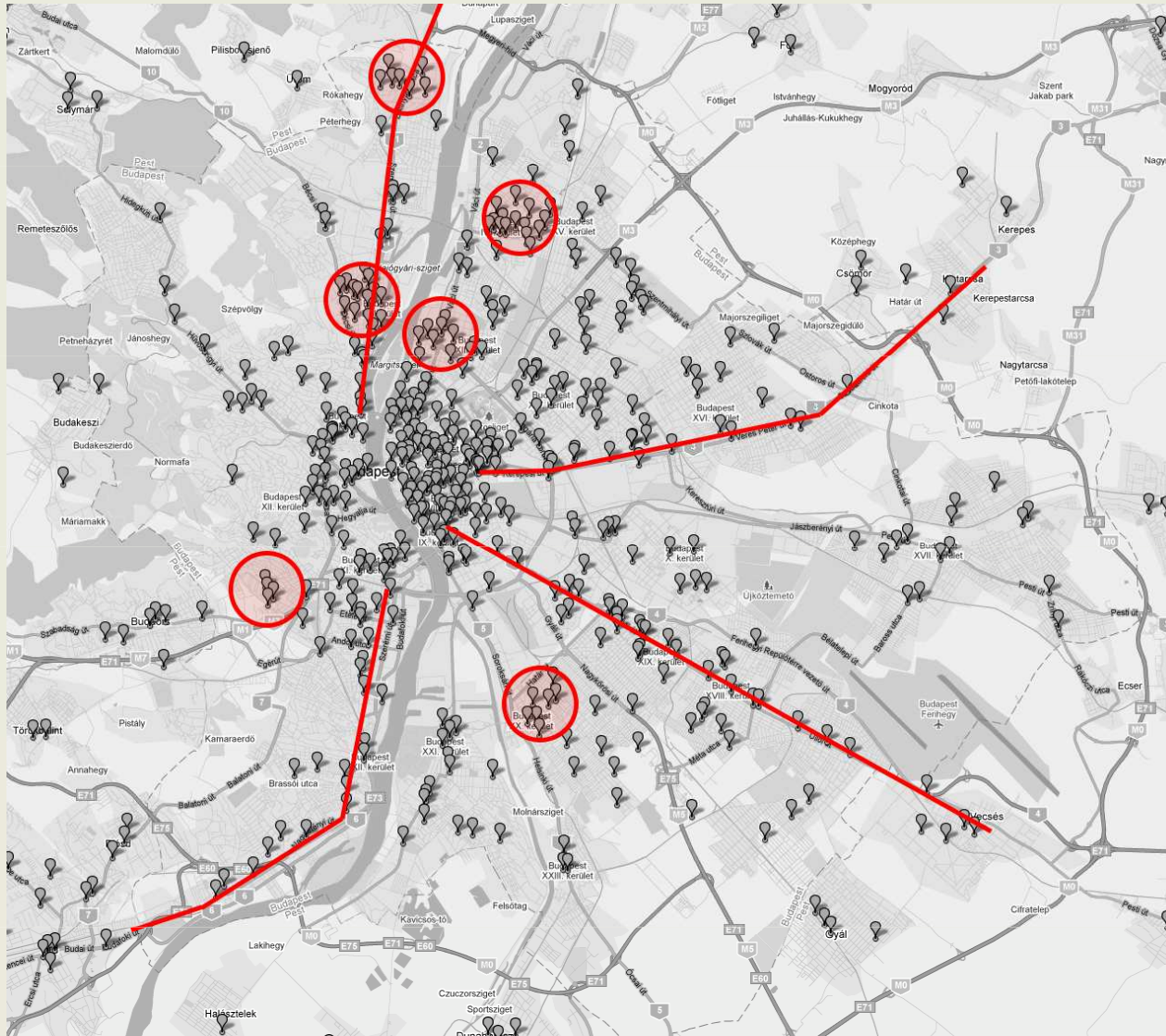
$$D = \left(\frac{C}{kvF} \right)^{\frac{1}{2}} \quad P = mc + \left(\frac{kC}{vF} \right)^{\frac{1}{2}}$$

- Goods purchased more frequently will generate a denser shop network but tighter profit margins.
- If the shop runs with higher fixed costs, the shop network is less dense and profit margins are higher.

Location of pharmacies

- András Gombos and András Hann studied the location of pharmacies.
- They found them evenly located.
- In Budapest a denser spatial distribution can be observed in housing estates where the population density is also higher.

Budapest



2. Market research

Corporate market: business decision-making

- A market research is conducted whether is it worth building the warehouse.
- How many potential customers are there?
- How much might the potential customers spend annually on goods retailed by the warehouse?
- What ratio of the potential consumption might be taken away by competitors?

Calculations

- Hungarian consumption structure / population = spending per capita
- Spending per capita x growth of annual real income x whitening correction factor = spending per capita in the neighbourhood
- Estimated number of residents in the neighbourhood x value of consumption per capita = estimated value of consumption in the neighbourhood
- Estimated turnover of all the shops in the neighbourhood - estimated value of consumption in the neighbourhood = potential capacity in the neighbourhood
- Potential capacity in the neighbourhood / estimated value of turnover per area = potentially buildable area

Investment plans of the company

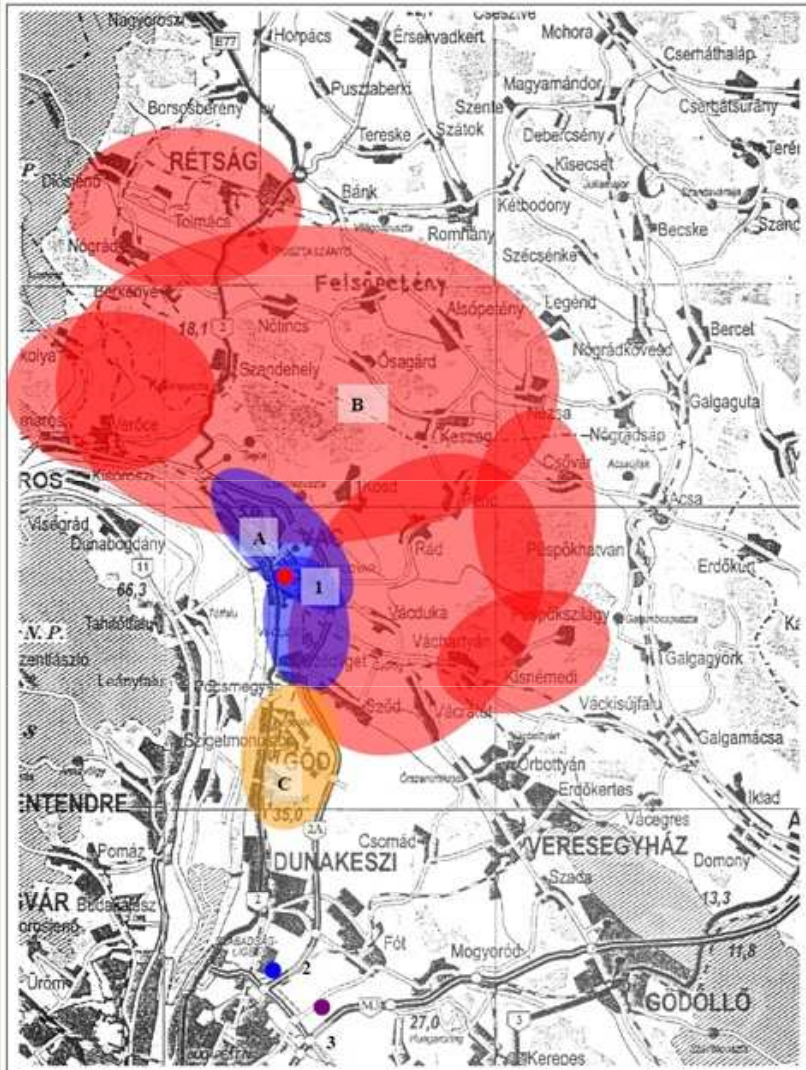
The planned hipermarket's menu

Goods	Planned floorspace (sqm)	Planned share in turnover (%)
Food	2 567	67,2
Cosmetics	518	
Electronics	1 127	14,1
Clothing	974	9,3
Books and stationery	488	2,8
Furniture	364	5,1
Other (vehicle, toys, seasonals)	962	1,5
Összesen	7 000	100,0

Consumer basket in Budapest (Ft/person)

	1995	1996	1997	1998	1999	1995 (%)	1999 (%)
Food	57 145	78 163	87 555	100 609	107 866	30,5	26,2
Tobacco, alcoholic beverages	12 515	14 306	16 292	21 094	22 966	6,7	5,6
Clothing	12 911	15 739	16 524	20 838	23 984	6,9	5,8
House maintenance	27 499	52 434	64 523	72 442	85 601	14,7	20,8
Houseware	11 123	13 015	14 134	20 902	21 514	5,9	5,2
Healthcare, medicals	9 298	16 713	18 410	22 161	24 461	5,0	5,9
Transportation, media, communications	27 819	38 155	48 519	51 741	65 526	14,7	15,9
Cultures, vacation, entertainment	13 667	23 521	22 532	28 562	31 756	7,3	7,7
Other personal	5 953	11 133	11 428	16 669	18 296	3,2	4,4
Housing	9 501	10 293	15 785	14 226	10 459	5,1	2,5
Total	187 431	273 473	315 702	369 243	412 428	100,0	100,0

A tervezett beruházás vonzáskörzetei



- A tervezett váci hipermarket (1)
- hipermarket – Dunakeszi (2)
- hipermarket – Fót (3)
- Elméleti (tágabb) vonzáskörzet (B)
- Gépkocsival mért tízperces (közvetlen) vonzáskörzet (A)
- Kérdéses vonzáskörzet (Auchan Dunakeszi miatt) (C)

The agglomeration of the planned investment and the agglomeration of the operating competitors.

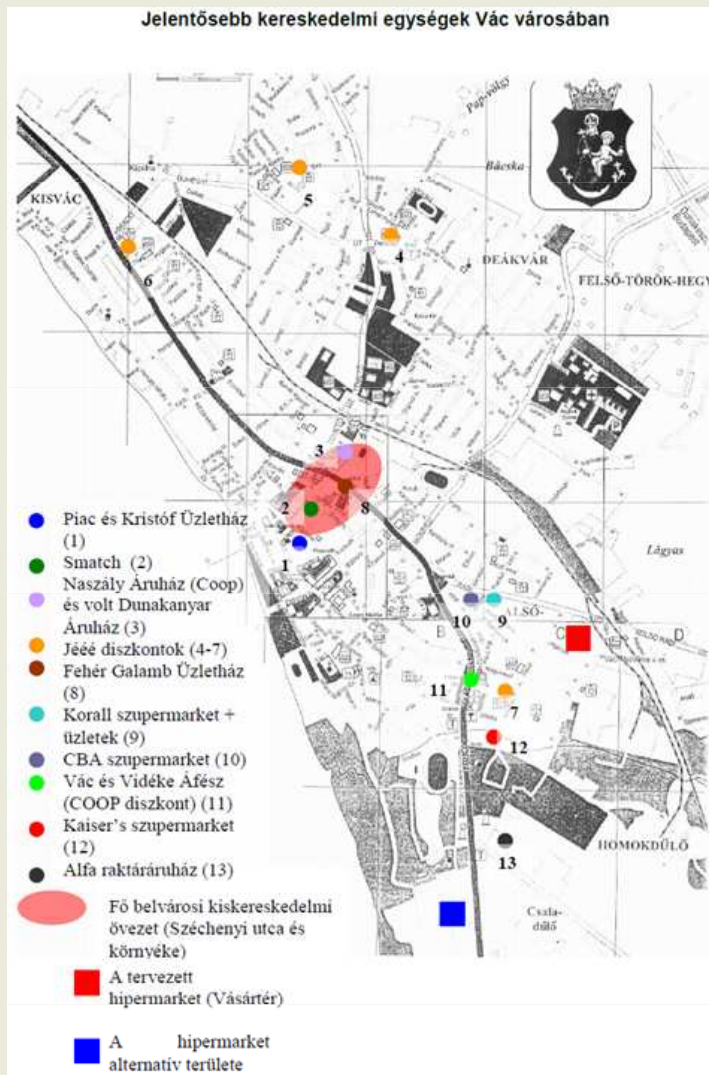
Population characteristics of the agglomeration

	Population (01.01.1991.)	Population (01.01.2000.)	Change in pop. % 1991-2000
Vác	33 858	33 350	-1,5
Szokolya	1 672	1 666	-0,4
Kismaros	1 512	1 601	5,9
Verőce	2 832	2 902	2,5
Kosd	2 144	2 092	-2,4
Csővár	689	672	-2,5
Rétság	4 306	2 847	-33,9
Szendehely	1 371	1 318	-3,9
Keszeg	635	669	5,4
Nézsa	1 184	1 180	-0,3
Agglomeration total	85 782	87 528	2,0

Purchasing power of the agglomeration

	1999		2000		2001	
Population	87 335		87528		87 721	
Turnover	Sum (mill Ft)	Per head (Ft)	Sum (mill Ft)	Per head (Ft)	Sum (mill Ft)	Per head (Ft)
Food	12 571	143 935	14 047	160 488	14 712	167 709
Textile, shoes, clothing	2 052	23 500	2 293	26 203	2 402	27 382
Furniture and electronics	6 018	68 908	6 725	76 832	7 043	80 290
Vehicles and accessories	5 402	61 859	6 037	68 973	6 323	72 077
Fuel	4 755	54 445	5 313	60 706	5 565	63 438
Cultural goods	3 916	44 837	4 376	49 993	4 583	52 243
Mixed others	1 439	16 479	1 608	18 374	1 684	19 201
Medicine, cosmetics	1 144	13 102	1 279	14 609	1 339	15 266
Second hand goods	136	1 553	152	1 732	159	1 810
Mail-order retail	80	920	90	1 026	94	1 072
Total	36 872	422 186	41 203	470 737	43 152	491 921

Retail space in Vác



Retail chain	Number of stores	Estimated floor space (sqm)
Kaiser's supermarket	1	1 400
Jééé discount	4	1 640
Coop supermarket	2	760
Alfa discount	1	3 000
Smatch supermarket	1	630
CBA supermarket	1	380
DM drogeria	1	250
Photo Porst	1	100
Kodak	1	100

Results: free floor space in the agglomeration

	Number of stores	Average floor space	Total floor space	Traditional	Modern	Total turnover	Total consumption in the agglomeration	Free capacity (million Ft)	Free floor space (sqm)
		sqm		turnover (Ft/sqm)		(million Ft)			
Food	282	60	16 920	700 000	1 500 000	11 844	14 712	2 868	1 912
Chemicals, cosmetics	61	50	3 050	420 000	700 000	1 281	1 339	58	83
Textile, shoes, clothing, sports	270	30	8 100	450 000	750 000	3 645	2 402	-1 243	-1 657
Electronics	255	50	12 750	600 000	1 000 000	7 650	5 206	-2 444	-2 444
Books, papers, stationery	59	30	1 770	420 000	700 000	743	4 583	3 839	5 485
Furniture	56	50	2 800	420 000	700 000	1 176	3 522	2 346	3 351
Other (vehicle devices, toys, etc.)	187	30	5 610	300 000	500 000	1 683			

Curriculum

- Denise DiPasquale–William C. Wheaton [1996]: *Urban Economics and Real Estate Markets*. Chapter 6.

Further readings

- András Gombos–András Hann [2011]:
Berth of pharmacies. *Urban and real estate economics course paper/referral*,
Spring 2011