

The Substitutability between Brick-and-Mortar Stores and e-Commerce

The Case of Books

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Motivation

- Rise of e-Commerce increased competitive pressure among retailers in various industries (e.g., Srinivasan 2002, J. Retail.).
- What is the degree of substitutability between B&M stores and e-Commerce from the viewpoint of consumers? (e.g., analyzed by Brynjolfsson, Hu and Rahman 2009, ManSci)
- Empirical analysis on the German book market
- Books constitute case of a horizontally and vertically differentiated good with relatively pronounced uncertainty prior to purchase
- “Service Provision” of B&M retailers
 - advice, expert opinion (e.g., Hilger, Rafert and Villas-Boas 2011, REStat for wine market; Reinstein and Snyder 2005, JIE for movie industry)
 - impulse purchases (e.g., Burt 2003, Journal of Retailing and Consumer Services)
 - showrooms (Bell, Gallino and Moreno 2017, ManSci)
 - reputable dealership (Marvel and McCafferty 1990, RAND)
- e-Commerce
 - price search (Tang, Smith and Montgomery 2010, IJIO)
 - low inconvenience costs
- General problem: Free-riding (Telser 1960, JLE) and limited attention in e-Commerce.

e-Commerce vs. B&M retailers

Quelle: <https://www.genialokal.de/buchhandlung/lich/eckschuster/>



Gesponsert
Mittelalter (Akademie Studienbücher - Geschichte)
von Harald Müller | 27. Mai 2015
★★★★☆ - 8
Taschenbuch
24,95*
✓prime Lieferung bis morgen, 20. September
GRATIS Versand durch Amazon
Nur noch 6 auf Lager (mehr ist unterwegs).



Gesponsert
Prima ankommen: Geschichte, Erdkunde, Politik: Klasse 7-10 - Arbeitsbuch DaZ mit Lösungen
von Dr. Yordanka Cakir-Delkaya, Maria Lutz, et al. | 1. September 2017
★★★★☆ - 1
Taschenbuch
9,99*
✓prime Lieferung bis morgen, 20. September
GRATIS Versand durch Amazon

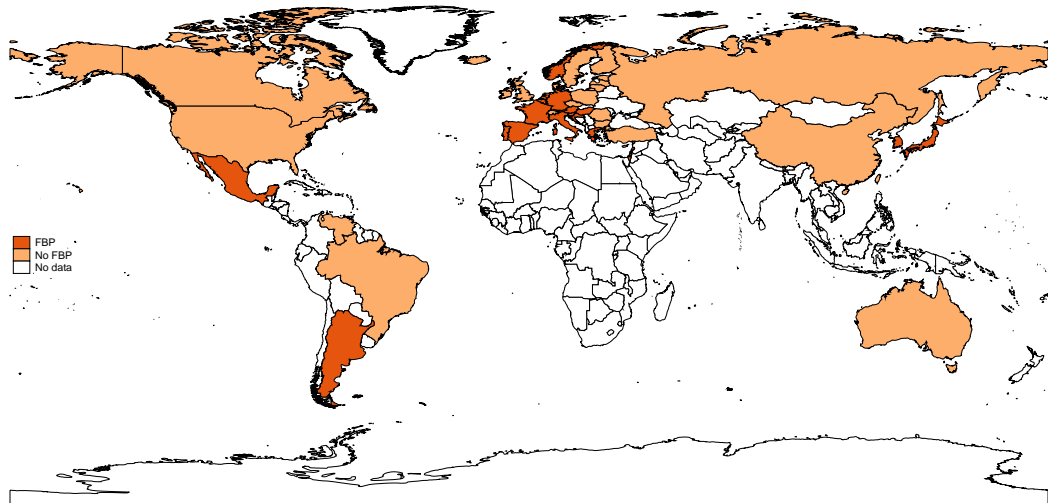


Das Mittelalter: Europa von 500 bis 1500
von Chris Wickham und Susanne Held | 13. Januar 2019
★★★★☆ - 8
Gebundenes Buch
35,00*
✓prime Lieferung bis morgen, 20. September
GRATIS Versand durch Amazon
Nur noch 20 auf Lager (mehr ist unterwegs).

Quelle: https://www.amazon.de/s?k=mittelalter+buch&__mk_de_DE=%C3%85M%C3%85%C5%BD%C3%95%C3%91&ref=nb_sb_noss_1

- If (some) consumers prefer B&M retailers over e-Commerce: increase in the number of B&M retailers has a positive impact on demand → empirical question
- We find evidence that this is indeed the case → e-Commerce and B&M retailers are not perfect substitutes.
- Result has consequences for evaluation of fixed book price systems (FBP).

Discussion: Fixed book prices

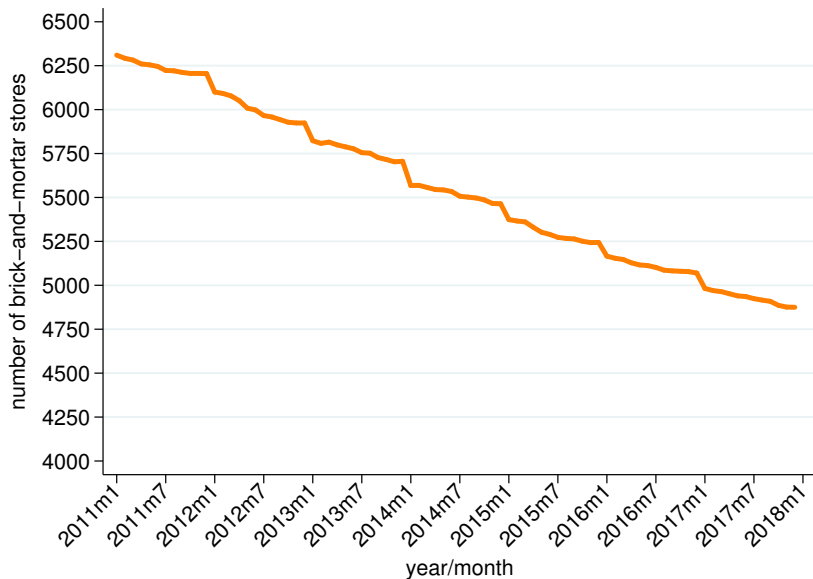


Discussion: Fixed book prices

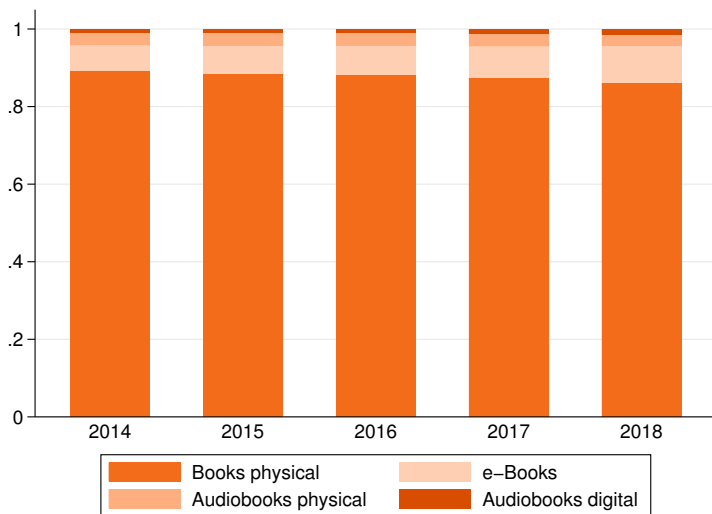
- Number of bookstores is higher with FBP (Dearnley and Feather 2002 *Publishing research quarterly*, Davies et al. 2004 DTI economics paper No. 9)
- We find that an increase in number of bookstores has positive effect on demand
- Hence, positive influence of FBP on book demand possible via number of bookstores
- Economic question: net effect of FBP?
- Political question?
 - More readers with high number of bookstores, higher prices? → heavy book readers?
 - Cheaper books?
 - General concern: which books become cheaper? Only bestsellers (Fishwick 2008, *International Journal of the Economics of Business*)?

- Evolution, locations and size of B&M retail stores in Germany, taken from the (historical) list of members of the German Publishers and Booksellers Association.
- Sales data is provided by the market research company MediaControl that tracks book sales in almost real time. It comprises data of
 - pure B&M retailers,
 - chain stores (w/ e-Commerce), and,
 - online retail, including Amazon.
- Consumer survey data (GfK)
 - Contains information on e-Book sales of some 20,000 consumers
 - Allows for an estimation of e-Book sales and revenue
- Data available on a **monthly basis** and on a **federal state level**.
- 9 different product groups: fiction, non-fiction, guide-books, school books, social sciences, natural sciences, humanities, travel, children books.
- January, 2011 to December, 2017.
- 1176×10 observations.

Number of B&M retailers in Germany



GfK Consumer Panel - "market share" of different formats (volume)



- Common share of e-Books and audiobooks taken together is at most about 14%.

Sales: Yearly aggregates

year	Scanner data		e-Book (estimate)		Total (estimate)	
	revenue	quantity	revenue	quantity	revenue	quantity
2011	3607.2	291.6	-	-	-	-
2012	3570.8	282.8	-	-	-	-
2013	3484.2	273.5	-	-	-	-
2014	3374.4	267.8	164.3	19.9	3538.7	287.7
2015	3386.7	266.5	174.5	21.9	3561.2	288.4
2016	3516.8	265.2	182.1	22.9	3698.9	288.1
2017	3469.7	257.8	177.8	23.7	3647.5	281.5

Scanner data does not include data on Thuringia and Saarland. e-Book sales have been scaled to the coverage of the scanner data, using market shares from the GfK consumer panel.

Sales: Monthly aggregates



- Hypothesis: There is no correlation between sales and the number of B&M stores retailers.
- Econometric caveats
 - Endogeneity of sales and number of outlets → IV-Approach using the labor force as instrument.
 - Intra-year trends → Estimate in differences and compare sales to sales in the same month last year.

- Regression

- 1st stage

$$grwstores_{i,t} = \delta_1 X'_t + \delta_2 \Delta pop_{i,t} + \delta_3 \Delta gtrends_{i,t} + \alpha_i + \Delta \varepsilon_{i,t} \quad (1)$$

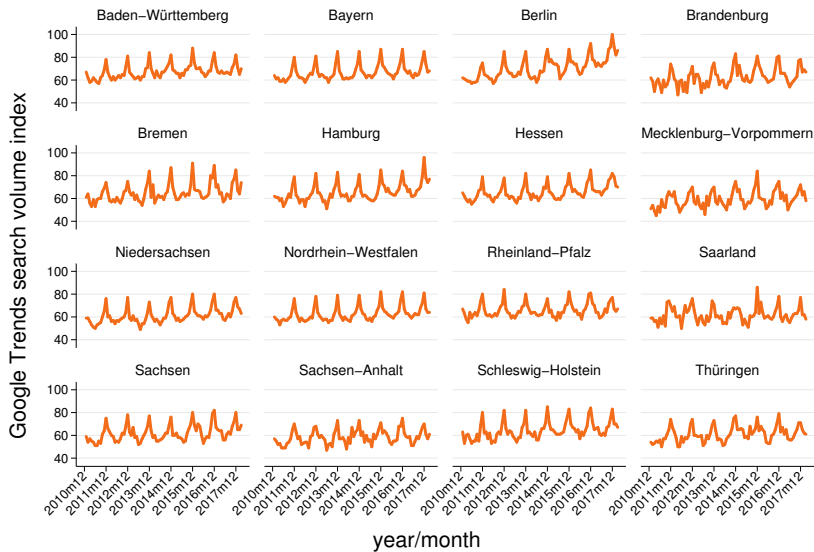
- 2nd stage

$$\Delta quantity_{i,t} = \beta_1 X'_t + \beta_2 grwstores_{i,t}^{fit} + \beta_3 \Delta gtrends_{i,t} + \alpha_i + \Delta u_{i,t} \quad (2)$$

- Variables

- $grwstores_{i,t} = \frac{(bookstores_{i,t} - bookstores_{i,t-12})}{bookstores_{i,t-12}}$
 - X'_t - vector of dummy variables for each year of the observation period
 - $\Delta gtrends_{i,t}$ - Google Trends index
 - α_i - Time-invariant dummy variables for the federal states
 - $\Delta quantity_{i,t}$ - number of sold books per capita/sales force
 - $grwstores_{i,t}^{fit}$ - fitted values from the first stage regression
 - i - federal state; t - month

Google Trends search volume index for the topic "book"



Graphs by Bundesland

Main estimation with physical book sales per capita as dependent variable

	(1)	(2)	(3)
	All books	Fiction	Nonfiction
grwstores	1.124*** (0.291)	0.543*** (0.0899)	0.168*** (0.0274)
2013	0.00114 (0.00768)	-0.0147*** (0.00252)	0.00194* (0.000773)
2014	0.0465*** (0.0100)	0.00989*** (0.00277)	0.00953*** (0.000860)
2015	0.0275*** (0.00617)	0.00919*** (0.00204)	0.00697*** (0.000680)
2016	0.00573 (0.00913)	0.00609* (0.00250)	-0.0000525 (0.000969)
2017	0.00381 (0.00567)	0.00328 (0.00178)	0.00234*** (0.000569)
Δ gtrends	0.00117 (0.000893)	0.000354 (0.000238)	0.000113 (0.0000817)
Anderson-Rubin Wald F-statistic	14.11	40.65	35.09
Kleibergen-Paap rk Wald F-statistic	107.9	107.9	107.9
# of observations	1008	1008	1008

Standard errors in parentheses. We apply a 2-step GMM estimation.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Estimation with total book sales per capita as dependent variable

	(1)	(2)
	All books	All books
	(incl. e-Books)	(incl. e-Books_grw.)
grwstores	0.729*	0.722*
	(0.336)	(0.323)
2016	-0.0214*	-0.0230**
	(0.00884)	(0.00861)
2017	-0.0222***	-0.0237***
	(0.00659)	(0.00623)
Anderson-Rubin Wald F-statistic	4.872	5.290
Kleibergen-Paap rk Wald F-statistic	61.18	61.18
# of observations	504	504

Standard errors in parentheses. We apply a 2-step GMM estimation.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

- Drop in the number of bookstores explains 33.4% for 2011-2017 of the decrease in physical book sales.
- On average, when a bookstore closed in the period 2011-2017, physical book sales decreased by 8,812 across all categories.
- Incorporating also e-Book sales into our estimations, we find that a decline in the number of bookstores explains 26.5%-55.6% for 2014-2017.
- Results indicate that B&M stores and e-Commerce are no perfect substitutes, i.e., there is no one-for-one substitution when bookstores close.
- Degree of substitutability depends on genres (see also Reinstein and Snyder 2005, JIE wrt. impact of expert opinion on box office sales for different movie genres)
 - sales of fiction titles decreased by 4,249 books.
 - sales of non-fiction titles decreased by 1,338 books.
- Results also show that about $\sim 23\%$ of decrease in sales of fiction titles can be explained by closure of bookstores. For non-fiction titles, the value is $\sim 59\%$ \rightarrow other variables (e.g., changes in leisure activities) have greater impact on sales of fiction titles than for non-fiction titles.

Appendix: Estimation with GfK consumer survey data only

	(1) All books (GfK data)
grwstores	1.067** (0.381)
2016	-0.00264 (0.0105)
2017	-0.0258* (0.0111)
Anderson-Rubin Wald F-statistic	8.605
Kleibergen-Paap rk Wald F-statistic	65.20
# of observations	576

Standard errors in parentheses. We apply a 2-step GMM estimation.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$