Urban Proximity and Farmland Prices: Evidence from the Berlin Brandenburg Metropolitan Region

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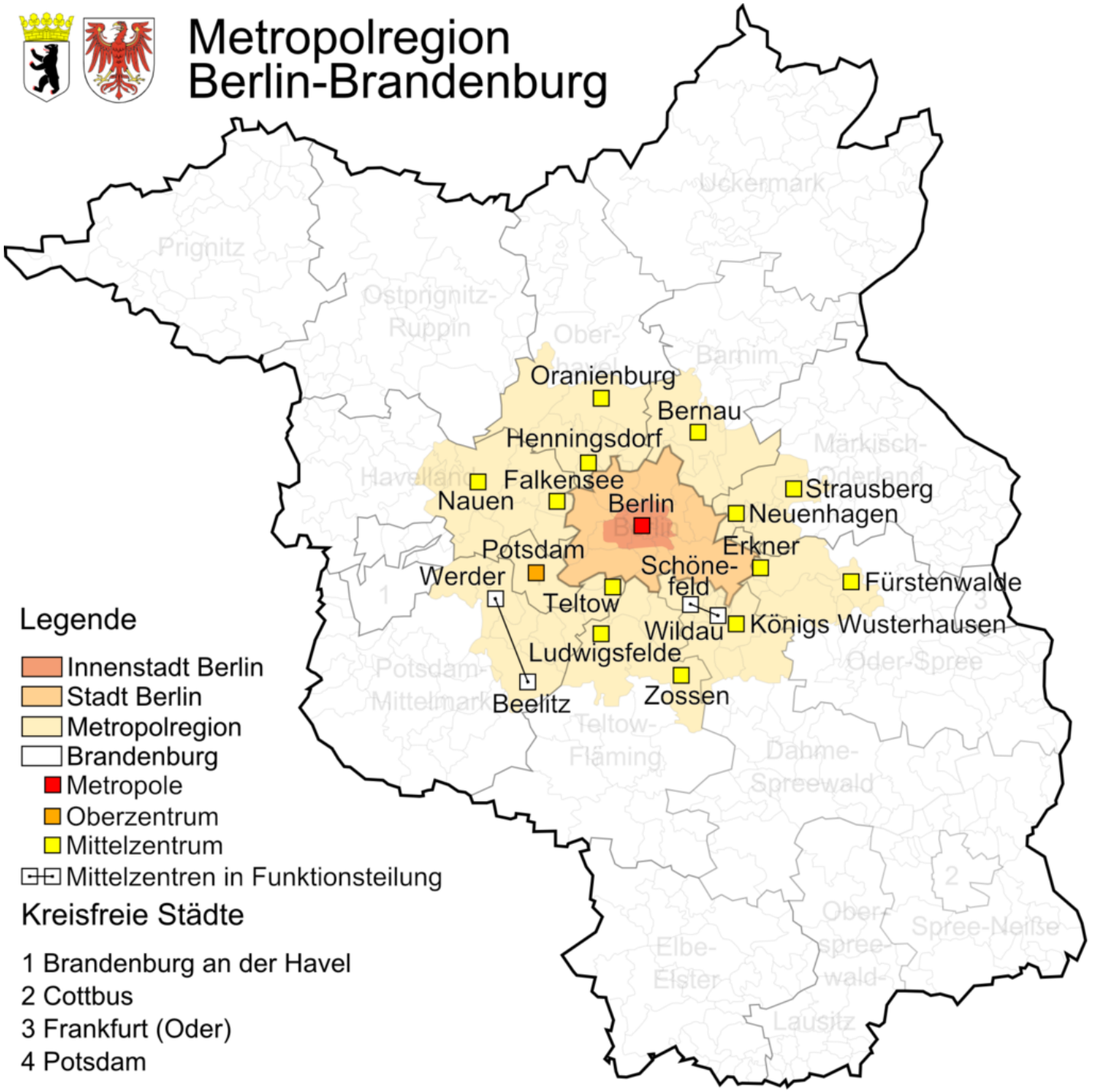
Motivation

- Urban proximity has been identified as one of the strongest non-agricultural price determinants for farmland prices
  - Think German economist John von Thünen's (1826) work: *the Isolated State* – 1st treatment of spatial economics & economic geography & economics of rent
  - Formal analysis of urban influences in European farmland market is scarce
- Migration into cities, in part fueled by immigration, is a global phenemonon.
- Berlin is one of the most populous European cities, and is growing

Research Question

- **How does urban proximity affect farmland prices in the Berlin Brandenburg Metropolitan Area?**
- We **hypothesize** that the effects could be potentially nonlinear with much stronger effects near the city centers
- It could reflect the higher option value of future urban development potential
- Brandenburg is especially suitable as a study region, due to the contrast between Berlin as an urban area and the low population density in Brandenburg

Primer on German Geography



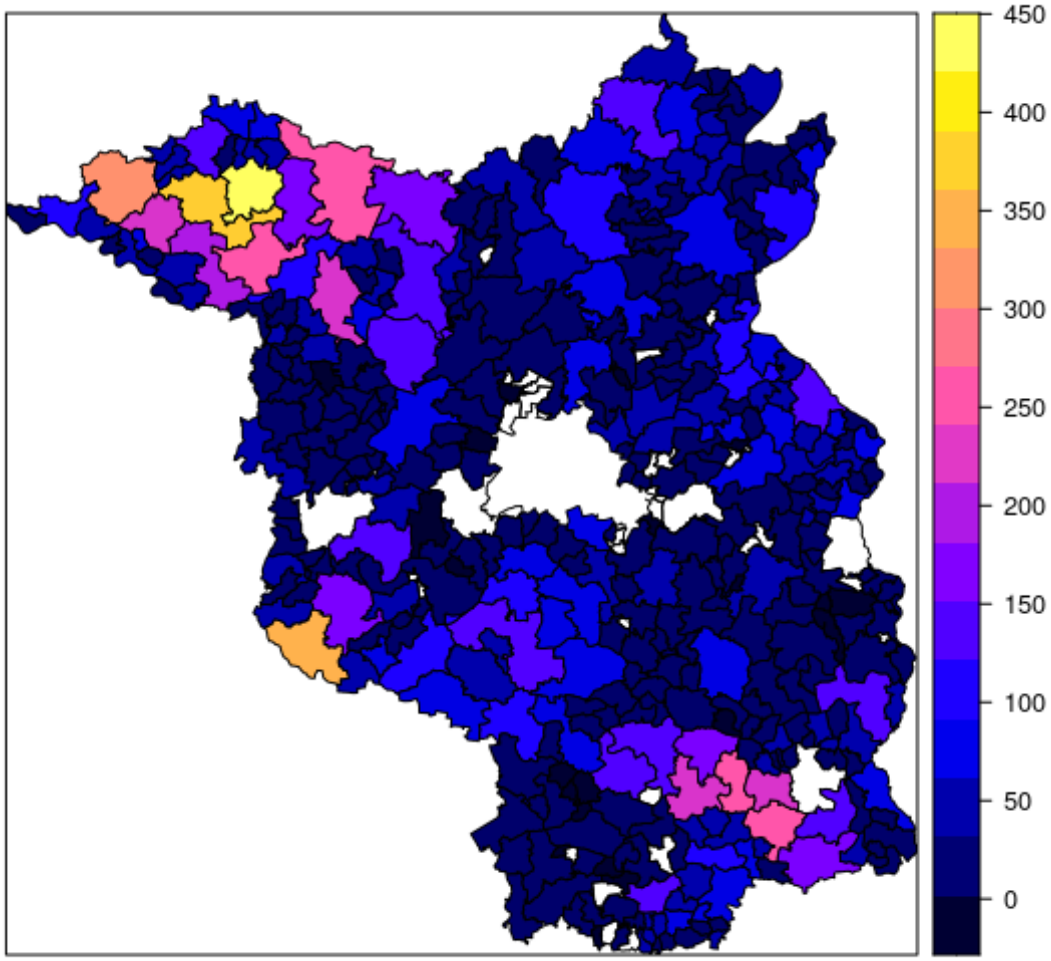
Data

Source: Oberer Gutachterausschuss Brandenburg *(Upper Expert Land Valuation Committee Brandenburg)*

The universe of 45,889 Farmland **sale transactions** of grassland and arable land from 1994 – 2021

Include both cropland and grassland sales

Smallest geographical level: Municipality identifiers



Number of arable land transactions in Brandenburg, 1994 - 2021

Summary of land transactions by county

County Name	Region	Average Distance in km to Berlin center	Average soil quality	Average price in euros/hectare	Number of sales
Barnim	northeast	58	30.91	6,870.83	1,277
Dahme-Spreewald	southeast	91	28.85	4,931.77	1,506
Elbe-Elster	south	148	31.69	3,387.19	2,091
Havelland	northwest	88	34.23	5,924.24	1,996
Märkisch-Oderland	northeast	70	39.99	6,306.25	5,250
Oberhavel	northwest	35	28.03	5,324.30	742
Oberspreewald-Lausitz	south	138	29.29	3,589.37	1,860
Oder-Spree	southeast	91	30.03	4,389.65	2,080
Ostpriegnitz-Ruppin	northwest	79	30.04	6,808.45	1,798
Potsdam-Mittelmark	southwest	89	29.58	5,821.24	2,943
Priegnitz	north	89	33.13	6,373.41	2,821
Spree-Neisse	south	204	31.39	4,186.86	1,538
Teltow-Fläming	southwest	78	28.14	4,171.54	4,034
Uckermark	northeast	107	38.65	9,722.54	2,152
AVERAGE	-	98.15	31.71	5,557.69	2,292

Conceptual Framework

- Framework includes the option value of land use conversion

$$V_{ict} = \sum_{s=t}^{t*} \frac{R_A(A_{is})}{(1+\theta)^{s-t}} + \sum_{s=t*}^{\infty} \frac{R_U(U_{is})}{(1+\theta)^{s-t}}, t \in [0, t^*]$$

- t^* as the optimal land use conversion point in time (from agricultural use to developing land)
- R_A are the returns from agricultural usage
- R_U are net returns from developing land after conversion costs
- A_{is} describe agricultural variables
- **U_{is} are nonagricultural variables, primarily due to urban proximity**

Measures of urban proximity

- Nearest distance from parcel to Berlin center
  - **Road distance in kilometers measured using Google Maps**
  - Travel time in minutes measured using Google Maps

- Nearest distance from parcel to Berlin MSA city edge
  - Road distance in km
  - Travel time in minutes

- Distance bands
  - Dummies for 0-20km, 20-40km, …. 80-100km band

Hedonic price regressions

- Base model:

$$P_{ict} = \beta_{0it} + \beta_{1it} distance_{it} + \beta_{2it} \boldsymbol{A_{it}} + \beta_{5it} population\ density + \beta_{6it} price\ index + \beta_{7it} D_{it}^{buyer\ type} + \beta_{8it} number\ of\ train\ stations + \sum_{j=1994}^{2019} \gamma_t + \sum_{j=2}^{14} \delta_c + e_{it}$$

β are the regression coefficients, A_{it} is a vector of agricultural price determinants, γ_t are the coefficients for the year dummies and δ_c are the coefficients for the location dummies

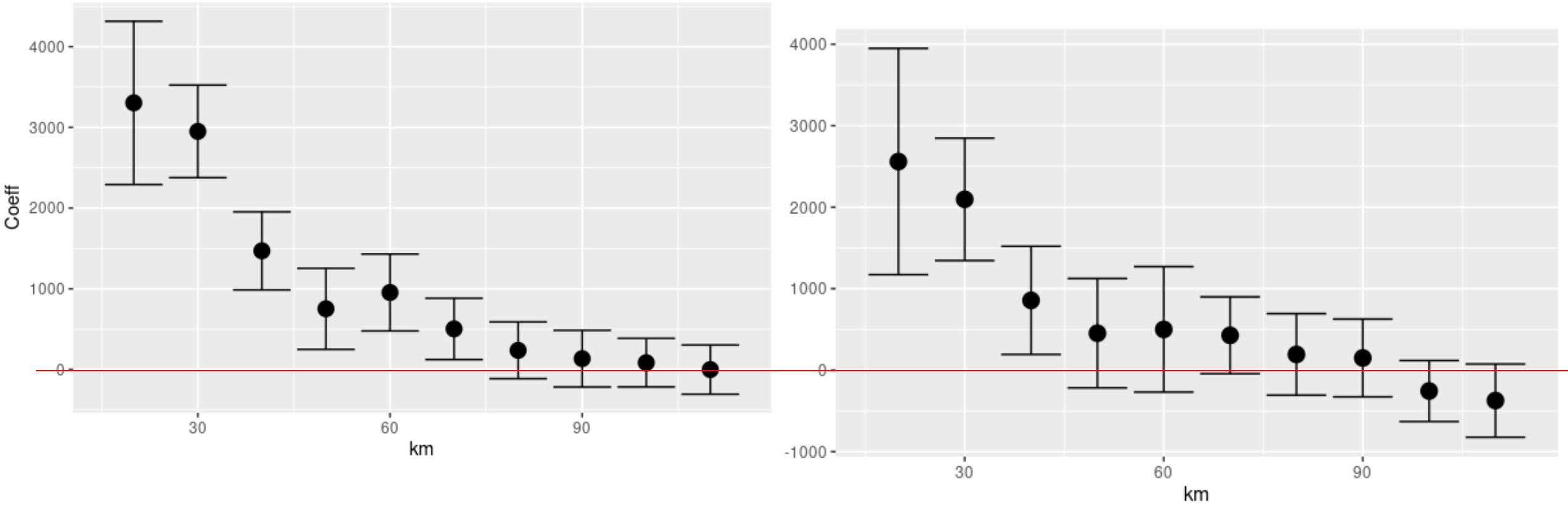
- Distance bands that allow for **nonlinear effects of urban proximity over space and time**

$$P_{ict} = \beta_{0it} + \beta_{1it} \boldsymbol{dist - bins}_{it} \left(\sum_{j-2}^{7} \alpha_k D_{it}^{distance} \right) + \beta_{2it} dist\_bins_{it} * \boldsymbol{post}\_08_{\boldsymbol{it}} + \beta_{3it} Ait + \beta_{4it} \boldsymbol{U_{it}} + \sum_{j=1994}^{2019} \gamma_t + \sum_{j=2}^{14} \delta_c + e_{it}$$

Results – spatial extent of urban influence

arable land/cropland vs. Grassland

70-80km vs. 40km

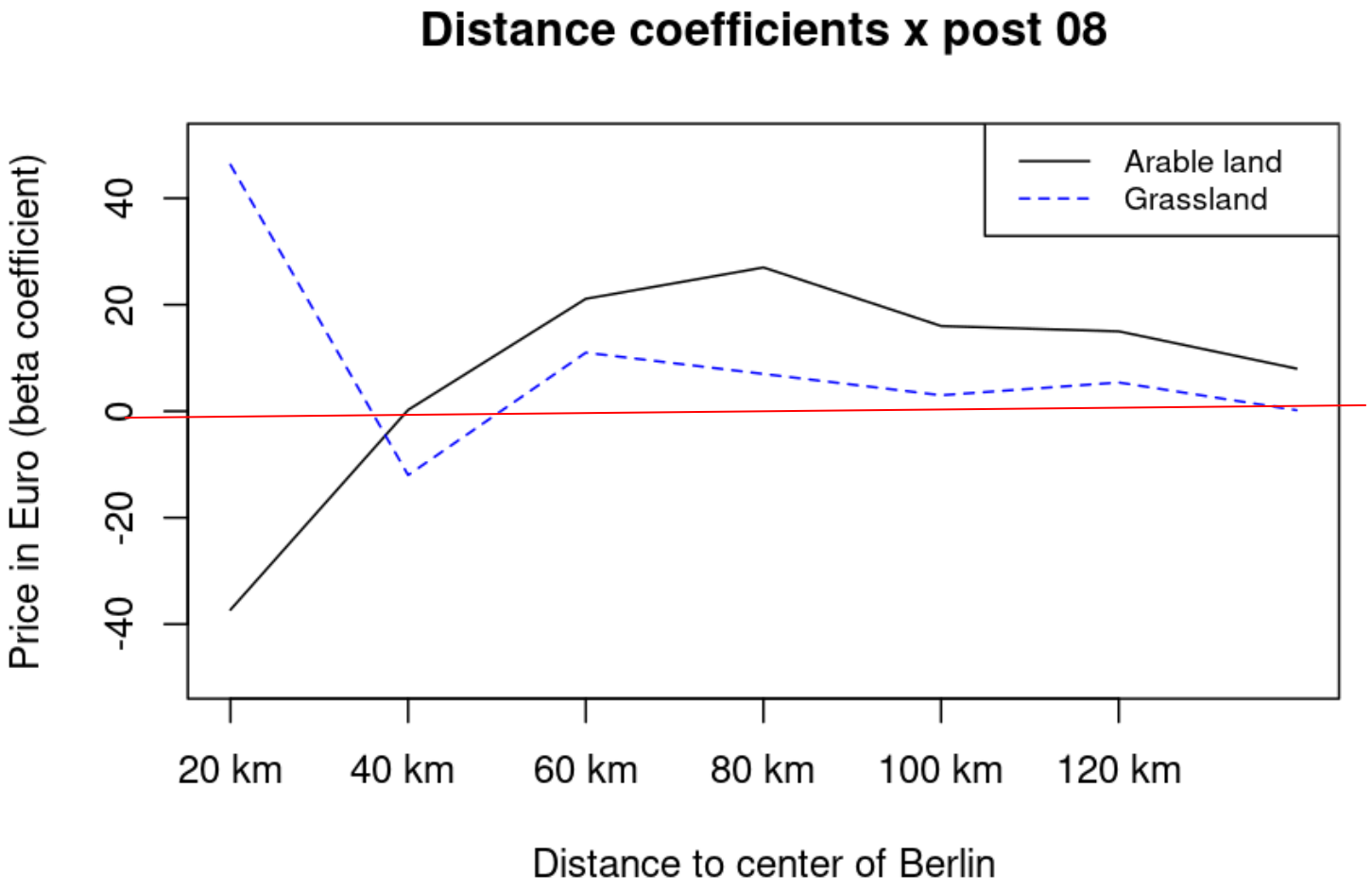


In percentage terms using log(P), the premium is 45% for parcels within 20km from Berlin relative to 130km away

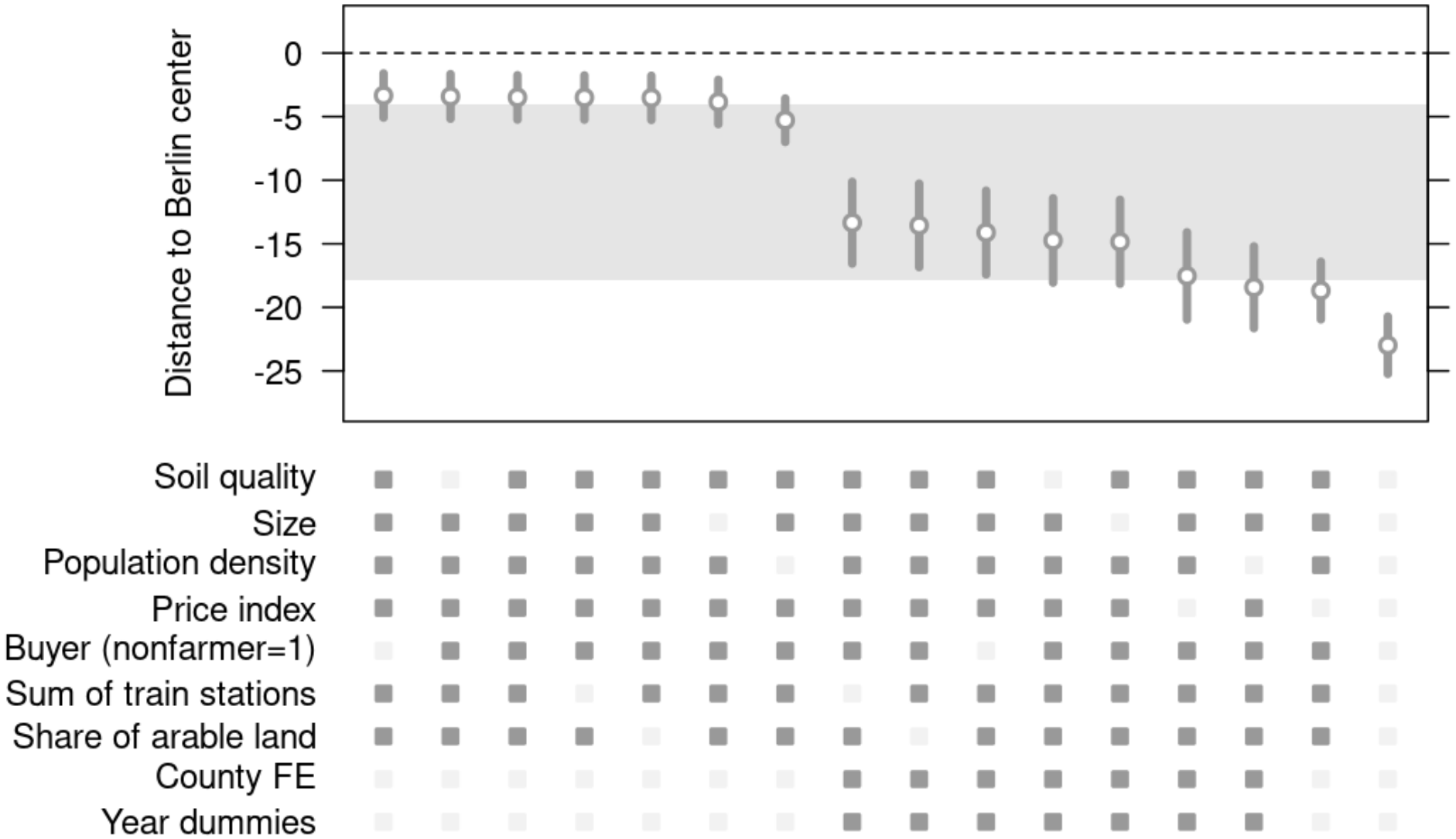
The premium drops to 10% for parcels 75km away

Results on time-varying changes

- Is urban influence different following 2008 financial crisis?
  - No effect for grassland
  - 0-20km close to Berlin is no longer as great
  - Still dominated by a urban premium story



Robustness check - specification charts for $\beta(dist_{it})$ – euro/acre effect for every km away from Berlin center



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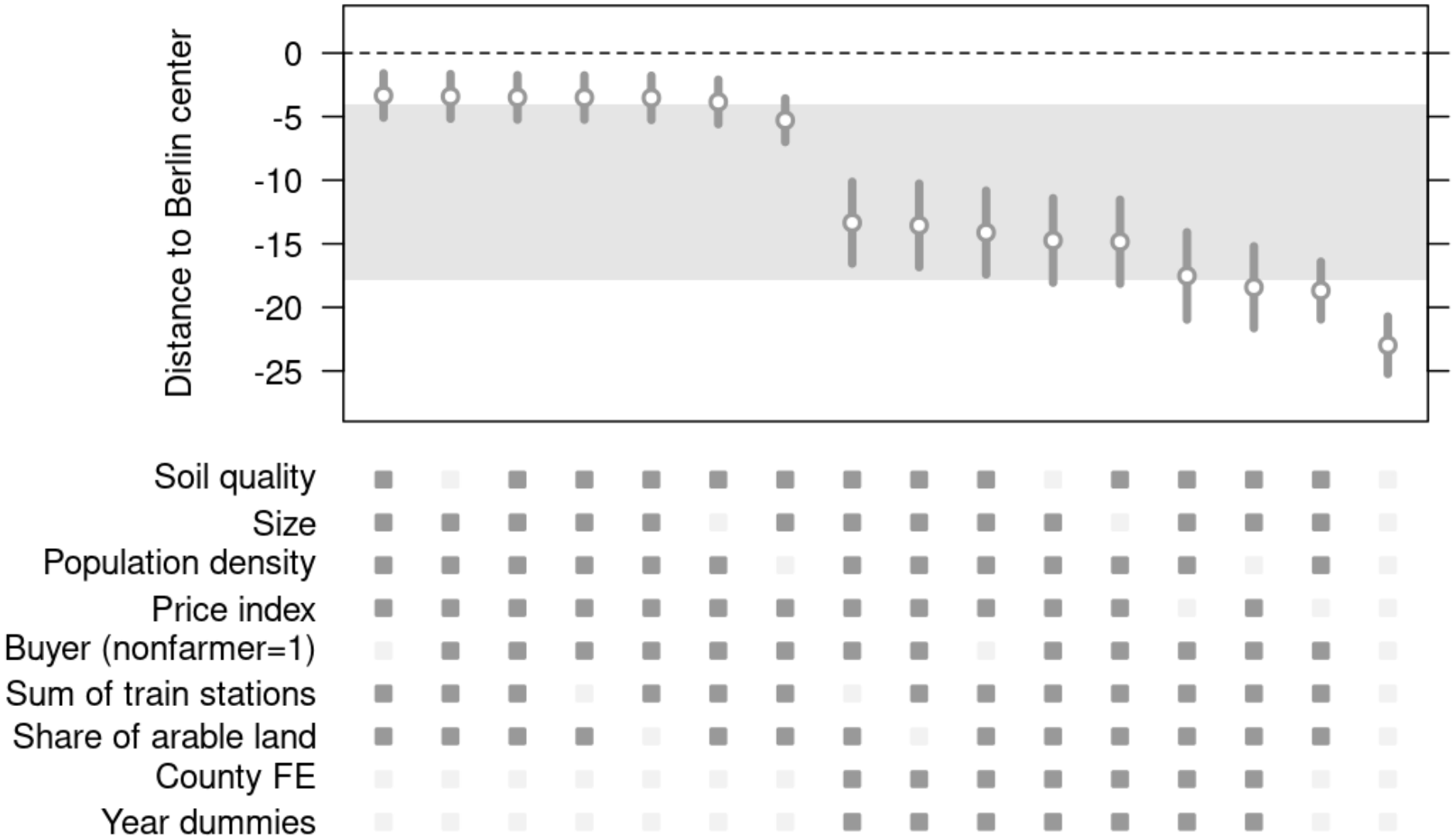
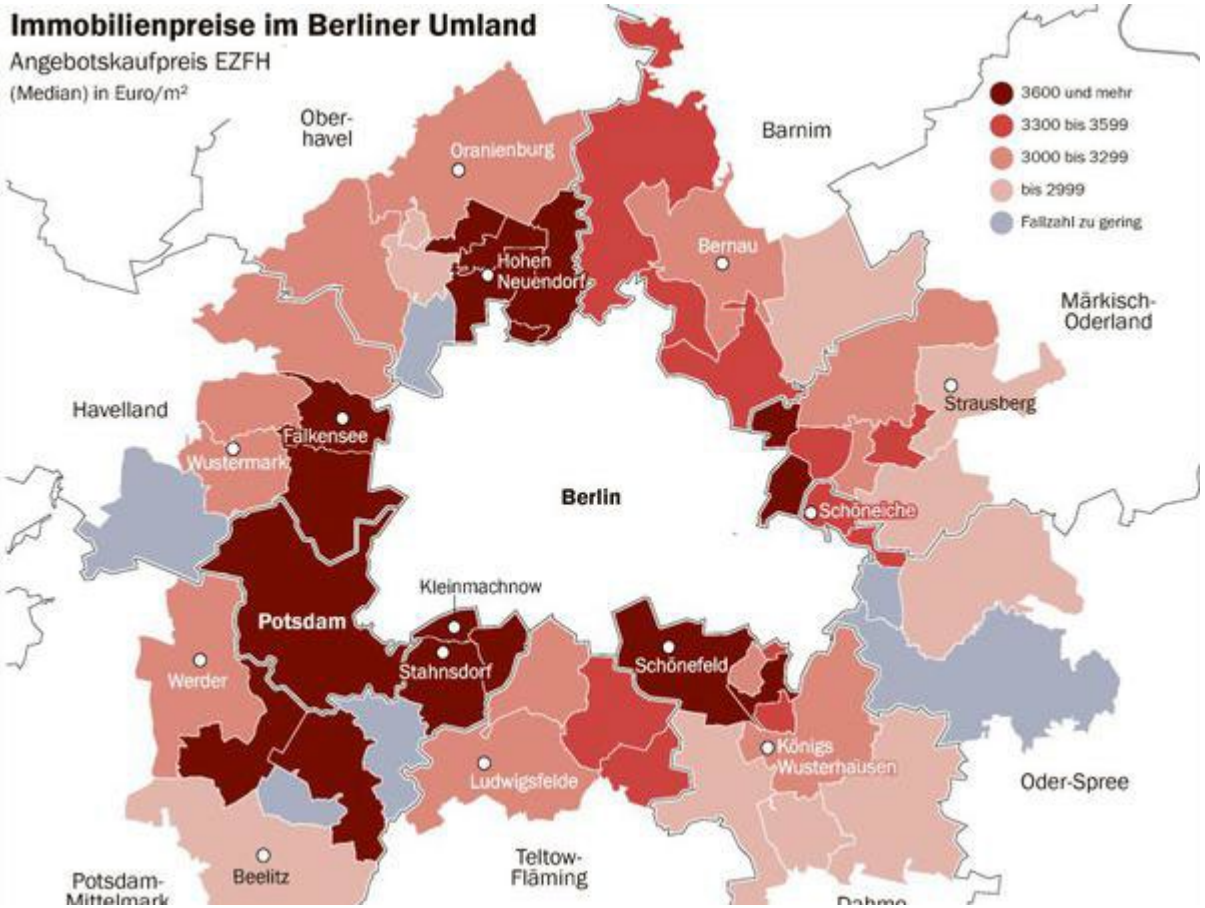


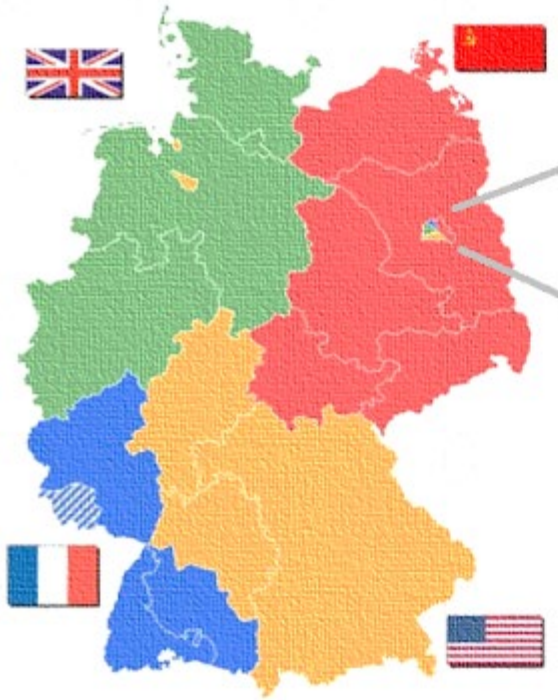
Future work – sources of heterogeneity

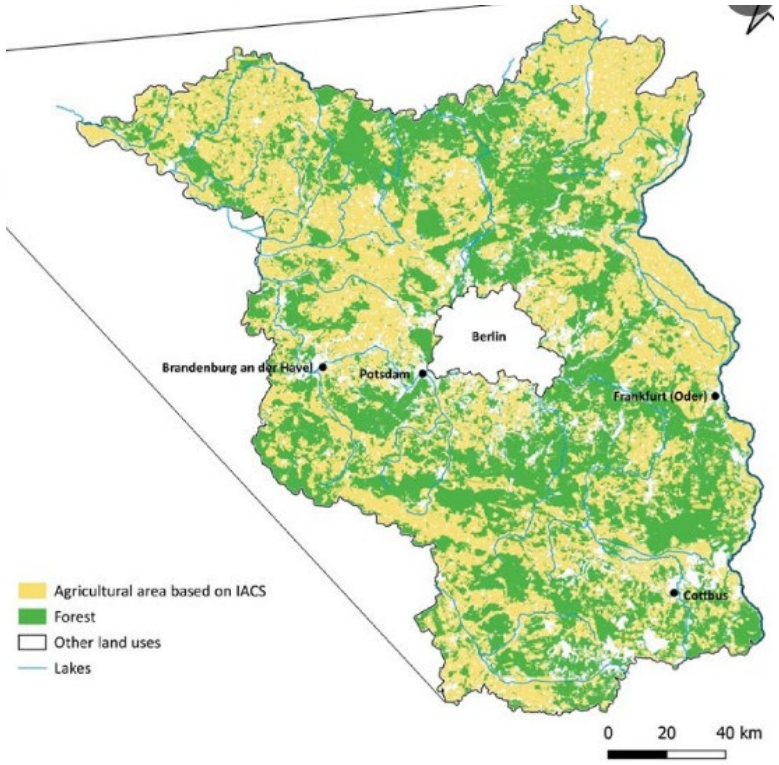


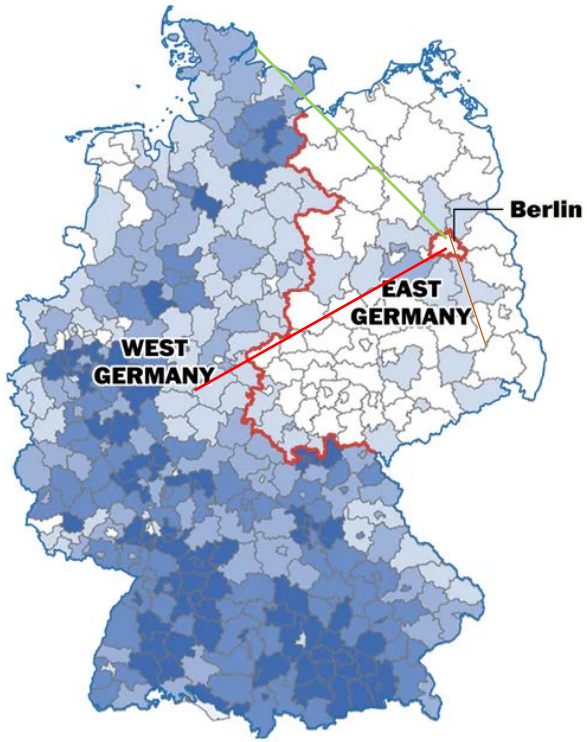
Speckgürtel

Bacon Belt – suburban sprawl

Future work – sources of heterogeneity







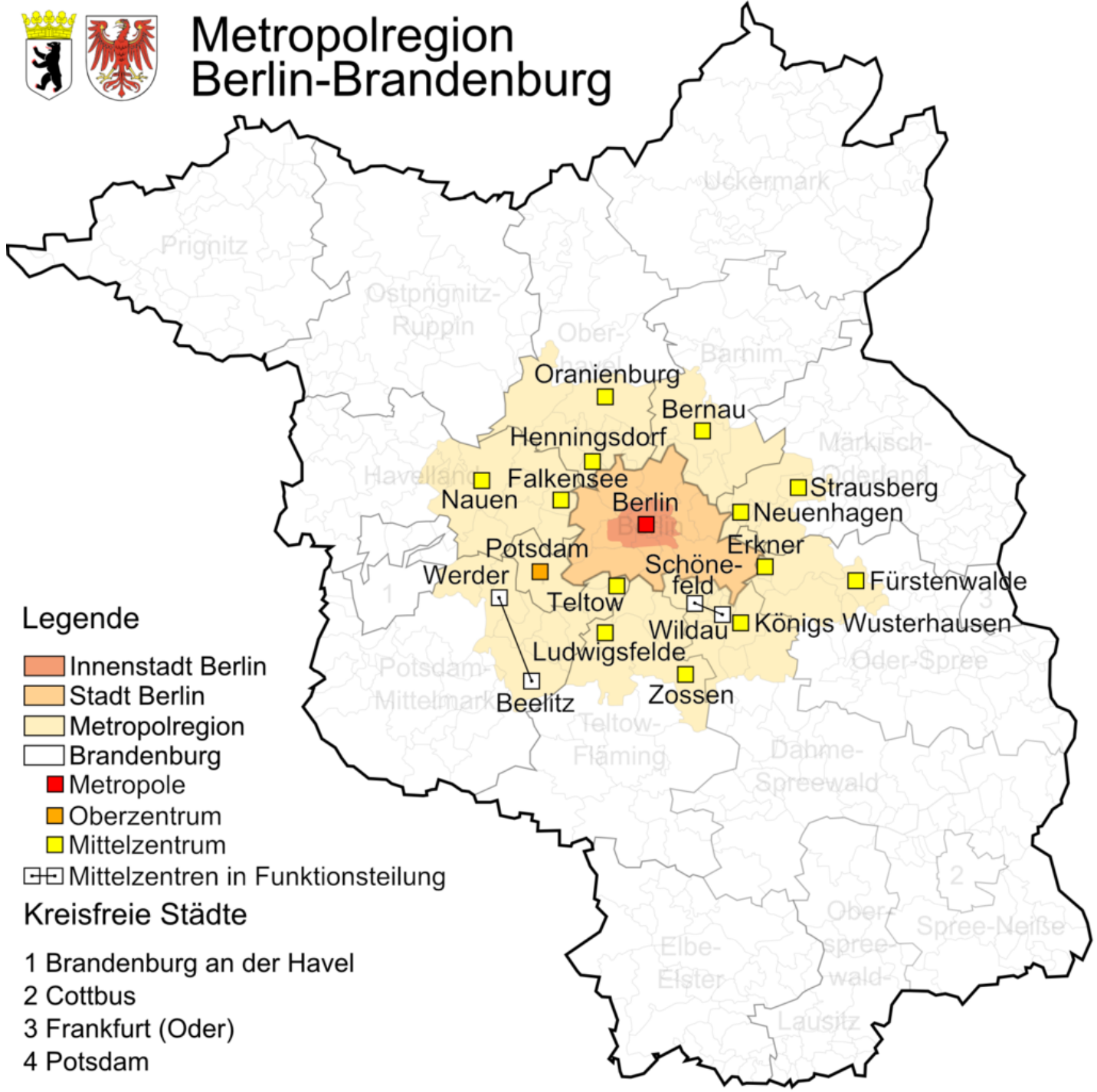
Disposable
Income

Data: 2011

More
Less

Future work: influences of multiple urban centers?

E.g., interactions with within close proximity to 2 or more cities with >100,000 people



Conclusion and Discussion

- Our study provides the first micro-level quantification of the influences of urban proximity to a major urban center on nearby farmland prices in a German context.
  - farmland prices are 10-15 € per hectare less expensive as the farmland parcel moves one kilometer away from the city center of Berlin.
  - The effects exhibit a distance decaying effect and extends to 70-80km for arable land, with a sharp drop at 40km
  - The effects of urban influences on grassland sales prices are much smaller

Thank you!

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