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The Impact of Public Employment: Evidence from Bonn

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The Impact of Public Employment: Evidence from Bonn

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Motivation

- Following Krugman (1991) there has been renewed interest in examining the equilibrium distribution of economic activity in space.
- By and large this literature has concentrated on the distribution of private sector activity.
- However, in advanced economies typically a non-trivial share of the workforce is employed in the public sector.
- In contrast to private sector employment, the distribution of public employment is unlikely to be exclusively driven by market forces.

Policy

- In fact, many governments explicitly use public employment as a form of regional policy.
- Disadvantaged regions are typically allocated larger shares of public employment for two main reasons:
 - First, public sector employment is supposed to directly create additional jobs in disadvantaged regions.
 - Second, such job creation is expected to also have positive spillovers on private sector activity in these regions.

This Paper

- In this paper we examine the impact of changes in public sector employment on the spatial distribution of private sector activity.
- We first consider a simple theoretical framework to examine the channels through which public and private sector employment interact.
- We then exploit the relocation of the German federal government in the wake of the Second World War as a source of exogenous variation to shed light on these mechanisms.

Related Literature

- With few exceptions, most notably Faggio and Overman (2011), there has been little direct analysis of the impact of changes in public employment on private sector outcomes.
- A large literature has examined shocks to local labor markets (e.g. Card 1990 and Moretti 2011 for a survey).
- One strand of this literature examines military base closures (e.g. aus dem Moore and Spitz-Oener 2012).
- There is also a developing literature evaluating other place based policies (e.g. Kline and Moretti 2012).

Road Map

- Historical background
- Theoretical framework
- Data
- Empirical strategy
- Basic empirical results
- Evidence on mechanisms

Historical Background

- As part of the founding of West Germany a seat for the new federal Government had to be found.
- There were four main candidate cities: Frankfurt, Stuttgart, Kassel and Bonn.
- Frankfurt was widely believed to be the most obvious choice, due to its history - seat of the first German parliament in 1848 - its good transport links, and size.
- However, in a narrow vote in the constitutional assembly Bonn emerged as the new seat of the federal government.

Map 1 - The Candidate Cities



Note: The circles on the map are proportional to the 1939 population of the cities

Theoretical Framework

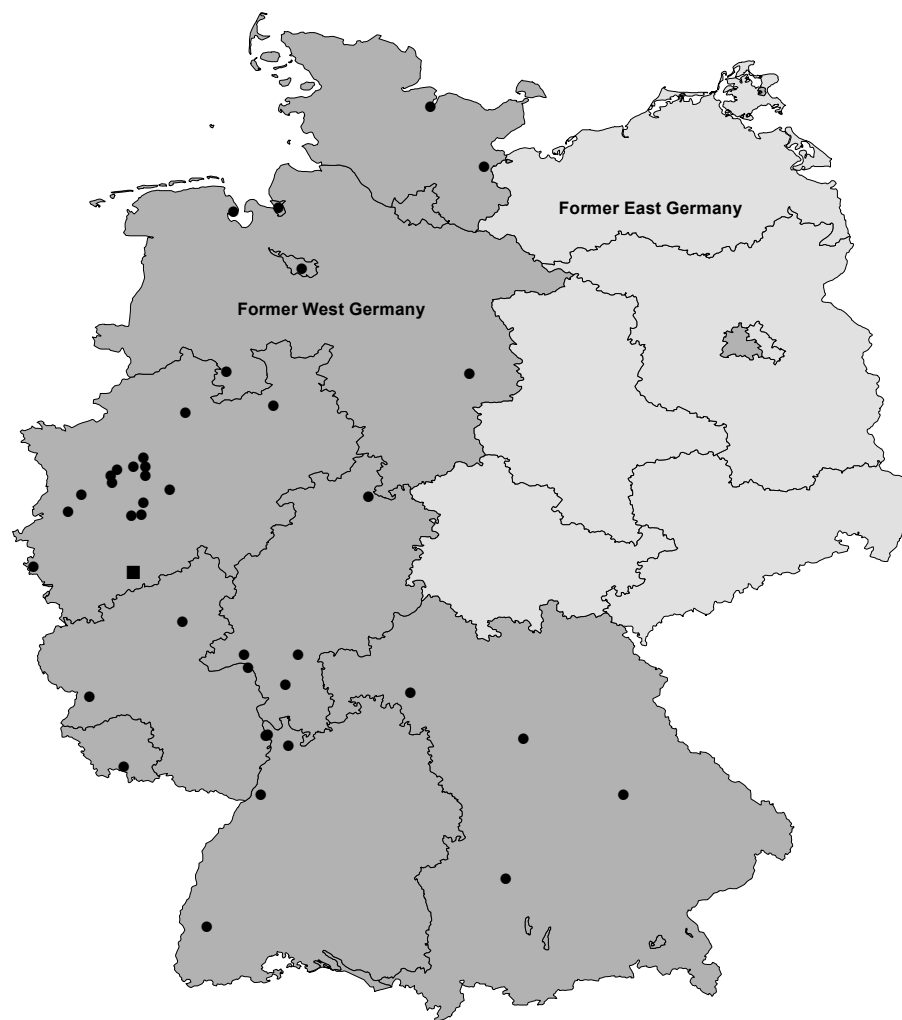
- Consider a standard Helpman (1998) type economic geography model with two ex-ante symmetric cities.
- There are both private and public sector workers.
- Public sector workers produce a global public good and their location is a policy parameter.

- Shifting public sector jobs from city 1 to city 2 has ambiguous effects on private employment in city 2:
 - Increased local house prices (and in the short run wages) will crowd out private employment.
 - Demand or productivity spillovers from public sector workers can make city 2 more attractive for private sector workers.
- Which of these forces dominates in practice is an empirical question.

Data

- Our basic dataset contains data for population and employment in four sectors at the city level:
 - Employment counts are taken from the 1925, 1933, 1939, 1950, 1961, 1970 and 1987 census.
 - In addition we also have population for 1919 and 1980.
- To provide evidence on the mechanisms at work we use:
 - Data on wages for all German employees from the social security records for 1987.
 - Information on rent per square meter paid by tenants as recorded in the 1987 census.

Map 2 - Control Cities



Note: The map shows the 40 cities that were in population rank closest to Bonn in 1939.

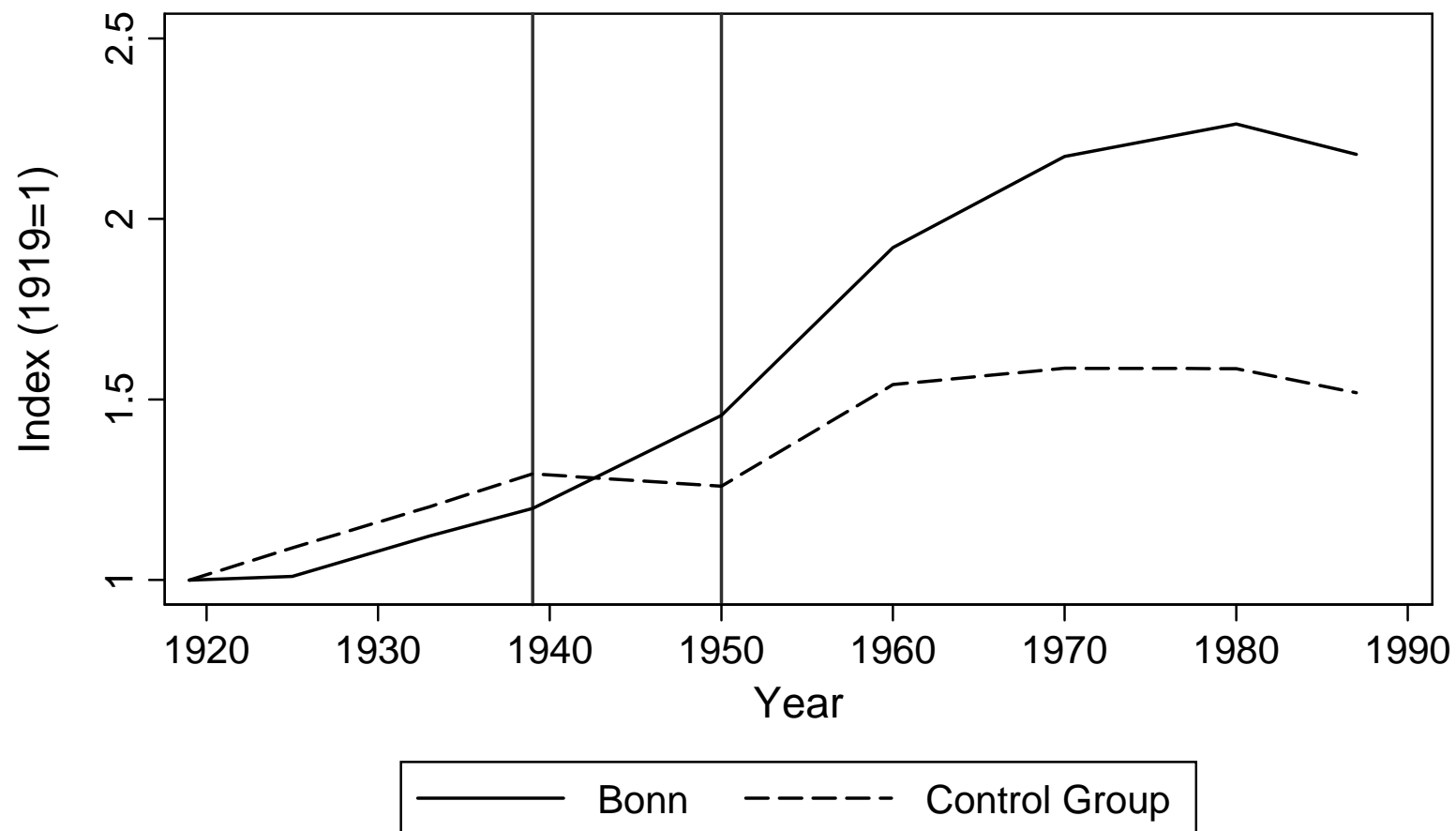
Basic Empirical Strategy

- Our basic empirical approach is to estimate difference in differences regressions of the form:

$$Y_{ct} = \alpha + \beta B_c + \gamma(B_c \times D_t) + \lambda_t + \varepsilon_{ct}$$

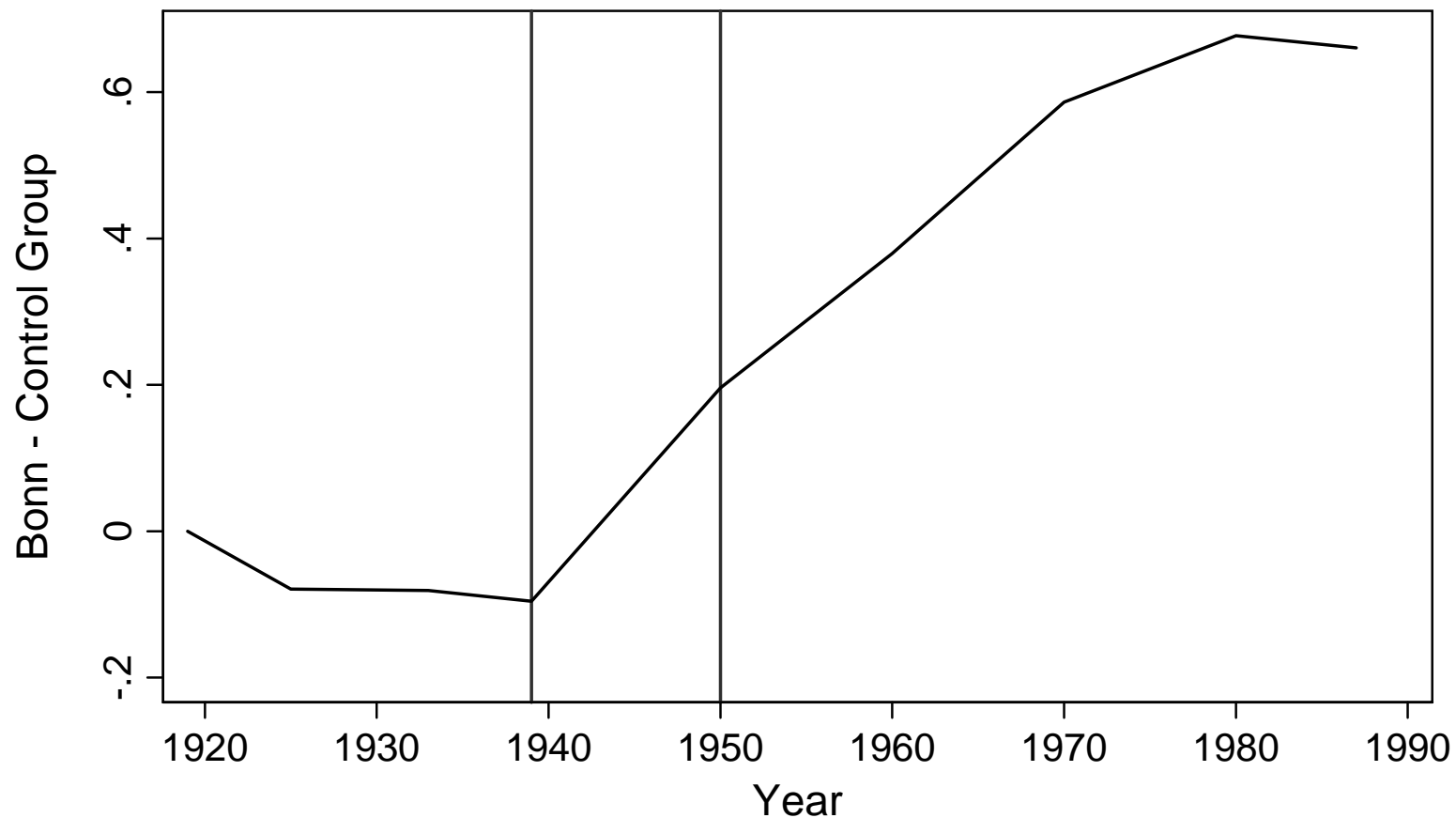
- Y_{ct} is the annualized growth rate of outcome Y in city c in period t
- B_c is a dummy for Bonn
- D_t is an indicator for division
- λ_t is a full set of time dummies

Population Index Bonn and Control Group



Note: The control group are the 40 cities which are closest to Bonn in terms of their 1939 population rank.

Difference in Population Indices



Note: The graphs shows the difference between the population indices for Bonn and the control group.

Table 2 - Population Treatment Effects all Cities

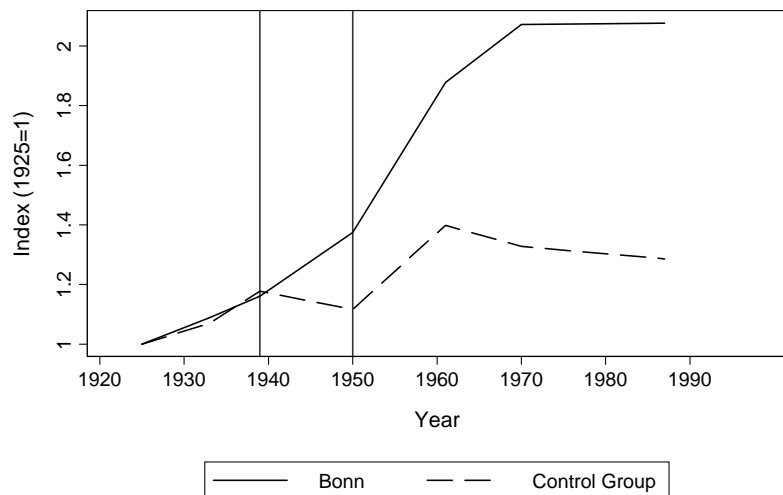
(1) Ten Most Negative Treatments			(4) Ten Most Positive Treatments		
(2) Rank	(3) Treatment	(5) Rank	(6) Treatment		
City		City			
Regensburg	14	-2.506	Bottrop	20	0.774
Bochum	17	-1.908	Mainz	3	0.835
Bremen	20	-1.317	Offenbach	19	0.923
Wilhelmshaven	8	-1.247	Muelheim an der Ruhr	5	0.998
Luebeck	1	-1.079	Saarbruecken	2	1.066
Ludwigshafen	2	-1.036	Muenster	3	1.072
Trier	16	-0.955	Wuerzburg	11	1.075
Kiel	14	-0.861	Bonn	0	1.120
Herne	7	-0.665	Freiburg	10	1.134
Recklinghausen	18	-0.662	Aachen	4	1.879

Note: Table shows the results of regressions of population growth on time dummies, a dummy for the listed city and its interaction with division. The column Treatment shows the point estimate of the interaction effect. Rank measures how close the city was to Bonn in terms of its 1939 population. Rank 1 are the two neighbours with population just below and above Bonn, and so on.

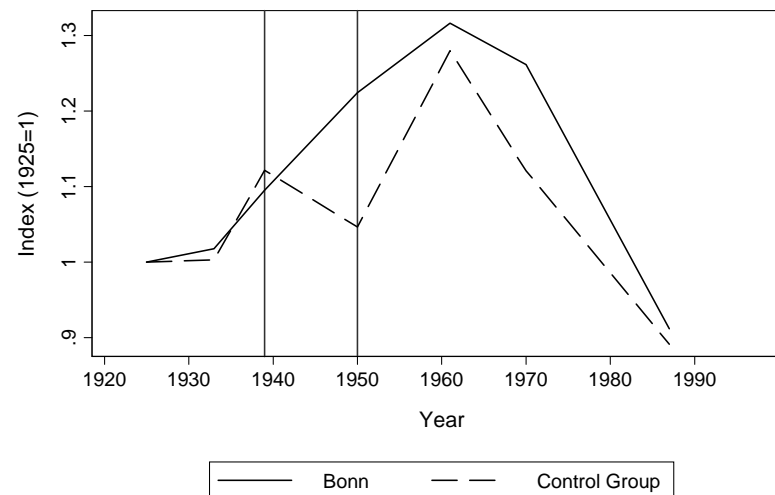
Impact on the Private Sector?

- The basic results show that Bonn experienced a substantial increase in population.
- Is the same true for private employment?

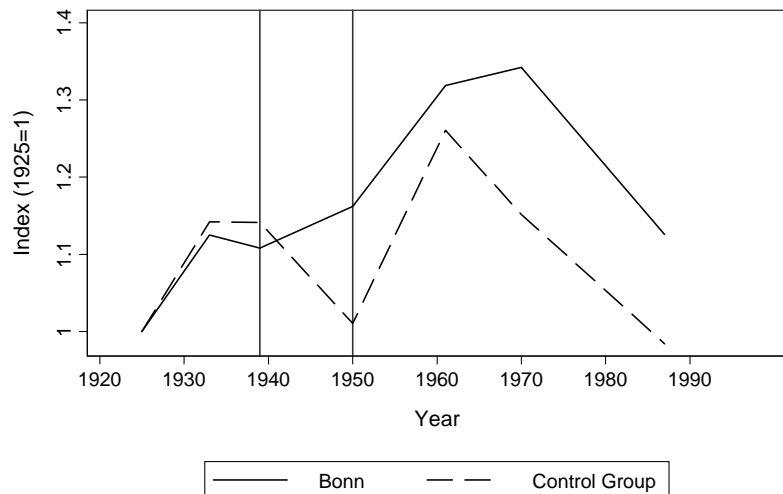
Total Employment Index Bonn and Control Group



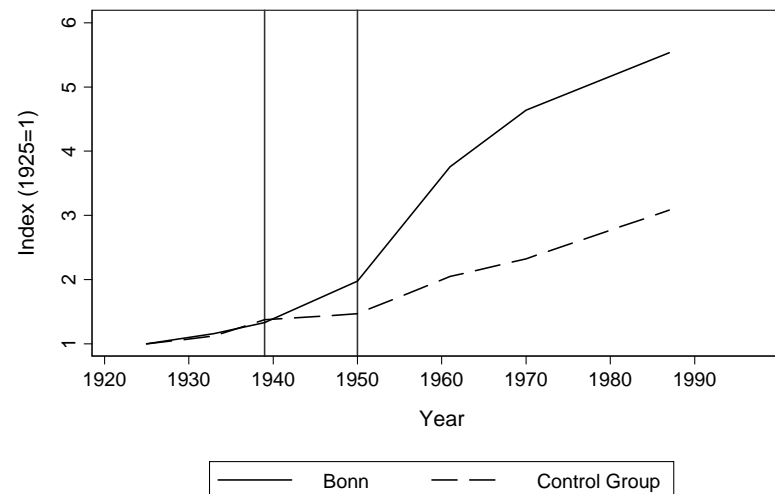
Industry Employment Index Bonn and Control Group



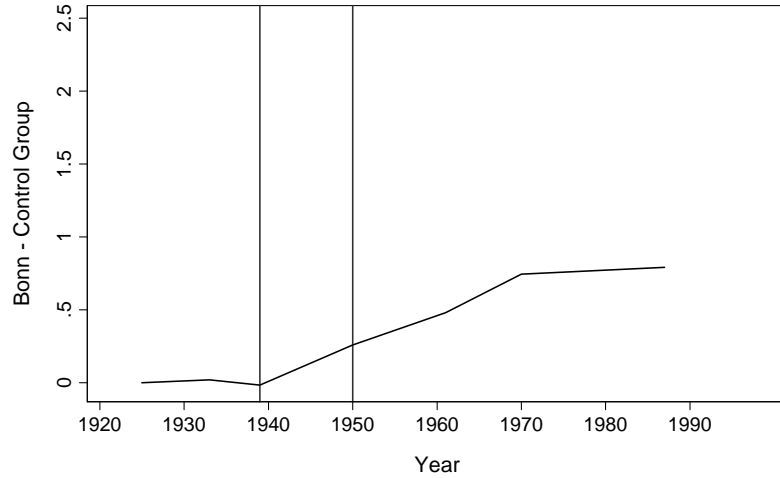
Retail Employment Index Bonn and Control Group



Other Employment Index Bonn and Control Group



Difference in Total Employment Indices



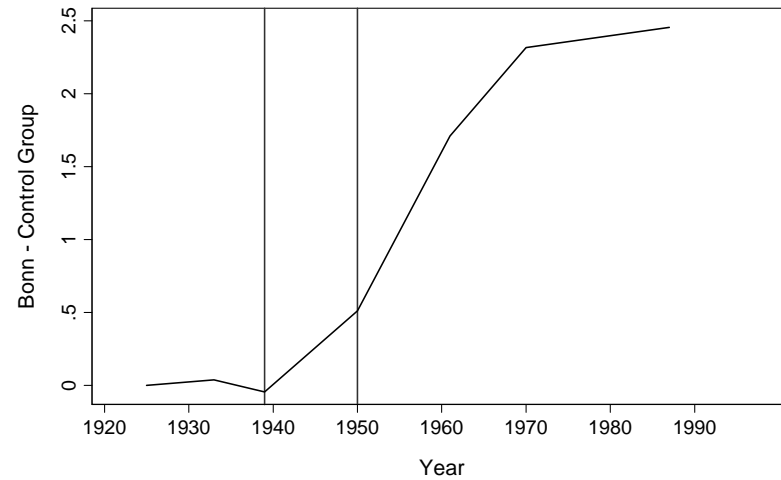
Difference in Industry Employment Indices



Difference in Retail Employment Indices



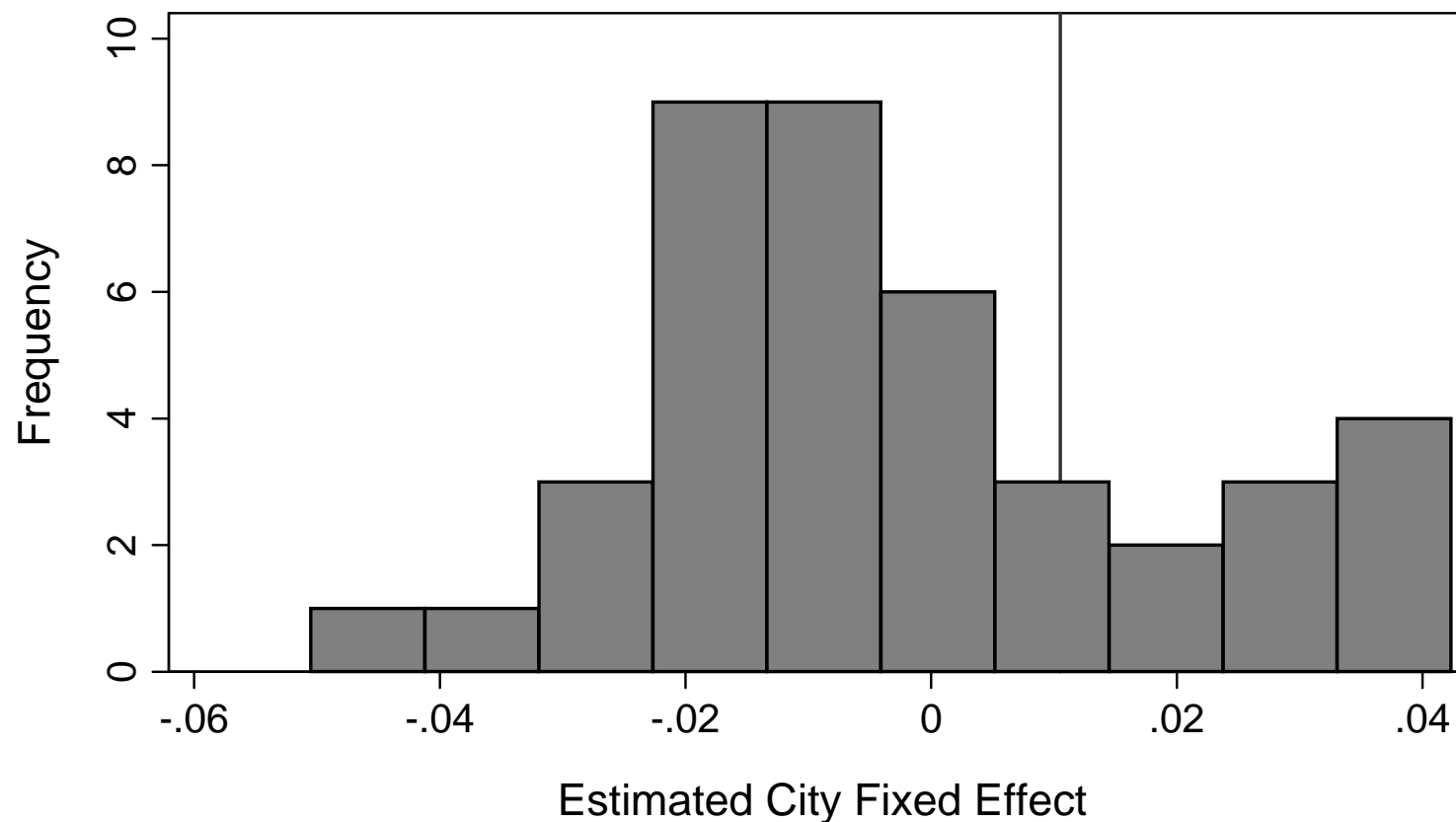
Difference in Other Employment Indices



Mechanisms: Wages

- Does the large increase in employment in Bonn result in an increase in local wages?
- To investigate this possibility, we use the universe of wages reported to the social security administration in 1987.
- We find that nominal wages in Bonn are at best 1 to 2 percent higher than in the control group in 1987.

Distribution of Wage Fixed Effects

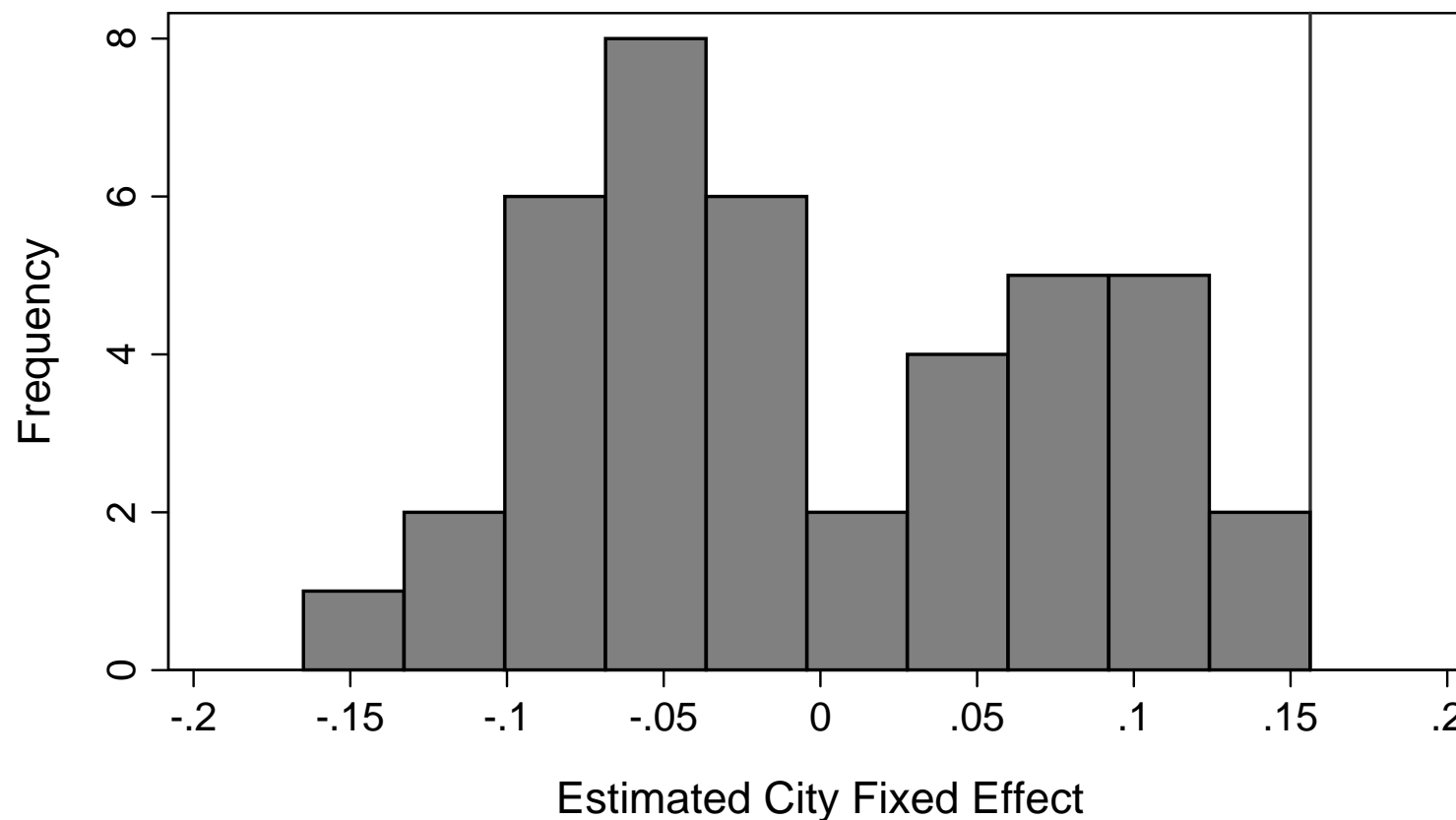


Note: The graph shows the distribution of the estimated city fixed effects in wages for all 40 control cities and Bonn. The vertical line is the estimated fixed effect for Bonn.

Mechanisms: Rents

- The other adjustment mechanism that our theoretical framework suggests, are local housing prices.
- We have information on rent paid per square meter for each respondent in the 1987 census.
- Renting is very common in Germany and accounts for well over 50 percent of the housing market.
- We find that consistent with the model, Bonn is between 15 and 20 percent more expensive relative to the control group.

Distribution of Rent Fixed Effects



Note: The graph shows the distribution of the estimated city fixed effects in rent paid for all 40 control cities and Bonn. The vertical line is the estimated fixed effect for Bonn.

Conclusion

- Exploiting the relocation of the German Federal Government after the Second World War, we find limited evidence that creating public sector jobs increases private employment.
- There are at best moderate increases in employment in the retail sector with no job growth in industry.
- We show that the increased overall activity in Bonn has substantially increased housing costs.
- There have been no comparable increases in nominal wages and real wages have probably declined.

Next Steps

- Use Synthetic Control Methods (Abadie, Diamond and Hainmueller 2010).
- Consider a larger control group.
- Find more detailed data on public employment (?).
- Find pre-WWII wages and rents (?).

Backup Tables

Table 1 - Basic Population Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Pop growth	Pop growth	Pop growth	Pop growth	Pop growth	Pop growth	Pop growth	Pop growth
Division x Bonn	1.093*** (0.142)	1.258*** (0.139)	1.152*** (0.161)		0.986*** (0.136)	1.128*** (0.139)	1.080*** (0.128)	
1950-1970 x Bonn				1.464*** (0.161)				1.248*** (0.160)
1970-1987 x Bonn				0.656*** (0.193)				0.675*** (0.174)
Bonn	-0.592*** (0.113)	-0.614*** (0.115)	-0.592*** (0.114)	-0.592*** (0.113)	-0.295** (0.110)	-0.313*** (0.112)	-0.295** (0.111)	-0.295** (0.110)
Conley and Taber (2011)	*	*	**	**	*	*	**	**
Controls for Destruction	No	Yes	No	No	No	Yes	No	No
Controls for Refugees	No	No	Yes	No	No	No	Yes	No
Drop Small Merger	No	No	No	No	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	287	280	287	287	257	250	257	257
R-squared	0.316	0.354	0.326	0.317	0.432	0.499	0.447	0.433

Note: the dependent variable is the annualised population growth. Standard errors are clustered on each city. *** denotes statistical significance at the 1 percent level. ** denotes statistical significance at the 5 percent level. * denotes statistical significance at the 10 percent level.

Table 3 - Basic Employment Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Employment Growth in Sector							
	Total	Total	Industry	Industry	Retail	Retail	Other	Other
Division x Bonn	1.112*** (0.155)	1.013*** (0.192)	-0.027 (0.185)	-0.166 (0.214)	0.337** (0.147)	0.216 (0.178)	1.318*** (0.225)	1.283*** (0.278)
Bonn	-0.290* (0.153)	0.015 (0.168)	-0.355* (0.178)	0.010 (0.184)	-0.321** (0.122)	-0.111 (0.121)	-0.283 (0.186)	-0.072 (0.205)
Conley and Taber (2011)		**						
Controls for Destruction	No	Yes	No	Yes	No	Yes	No	Yes
Controls for Refugees	No	Yes	No	Yes	No	Yes	No	Yes
Drop Small Merger	No	Yes	No	Yes	No	Yes	No	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	205	184	205	184	205	184	205	184
R-squared	0.414	0.510	0.445	0.514	0.598	0.657	0.214	0.258

Note: the dependent variable is the annualised rate of growth in employment in the sectors shown above. Standard errors are clustered on each city. *** denotes statistical significance at the 1 percent level. ** denotes statistical significance at the 5 percent level. * denotes statistical significance at the 10 percent level.

Table 4 - Wage Effects

	(1)	(2)	(3)	(4)
	log (wages)	log (wages)	log (wages)	log (wages)
Bonn	-0.016* (0.006)	0.004 (0.005)	0.013*** (0.004)	0.011*** (0.003)
Experience		0.034*** (0.000)	0.032*** (0.000)	0.032*** (0.000)
Experience squared		-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Female		-0.247*** (0.007)	-0.216*** (0.032)	-0.216*** (0.005)
Foreigner		-0.044*** (0.005)	-0.032*** (0.003)	-0.032*** (0.003)
log (Population)				0.014** (0.006)
Education Dummies	No	Yes	Yes	Yes
Industry Fixed Effects	No	No	Yes	Yes
Observations	3,098,749	2,928,653	2,927,750	2,927,750
R-squared	0.19	0.42	0.52	0.52

Notes: All estimations account for top coding. Standard Errors are clustered at the level of the city. *** denotes statistical significance at the 1 percent level. ** denotes statistical significance at the 5 percent level. * denotes statistical significance at the 10 percent level

Table 5 - Rent Effects

	(1)	(2)	(3)	(4)
	log (rent/m ²)	log (rent/m ²)	log (rent/m ²)	log (rent/m ²)
Bonn	0.192*** (0.016)	0.191*** (0.019)	0.170*** (0.015)	0.156*** (0.015)
Age of the Building			-0.009*** (0.000)	-0.009*** (0.000)
Age of the Building Squared			0.000*** (0.000)	0.000*** (0.000)
Flat Size (m ²)			-0.006*** (0.000)	-0.004*** (0.000)
Flat Size Squared (m ²)			0.000*** (0.000)	0.000*** (0.000)
log (Population)		0.005 (0.037)	0.002 (0.029)	0.007 (0.029)
Building Typ Dummies	No	No	Yes	Yes
Additional Building Controls	No	No	No	Yes
Subsidy Controls	No	No	No	Yes
Observations	5,802,386	5,802,386	5,802,386	5,802,386
R-squared	0.01	0.01	0.21	0.31

Notes: Standard Errors are clustered at the level of the city. Additional building controls are heating system type indicators, rent duration indicators, and indicators for the number of rooms. Subsidy controls are an indicator for social housing units, and indicators whether none, some or all the flats in the house are social housing units, an indicator for rent controls and an indicator whether the flat is a corporate flat. *** denotes statistical significance at the 1 percent level. ** denotes statistical significance at the 5 percent level. * denotes statistical significance at the 10 percent level