Clear for Takeoff? Investigating the Response of Unemployment to Military Spending in the Nazi Economy Using Evidence from the *Luftwaffe*

Thesis Defense

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Sciences Po

Motivation

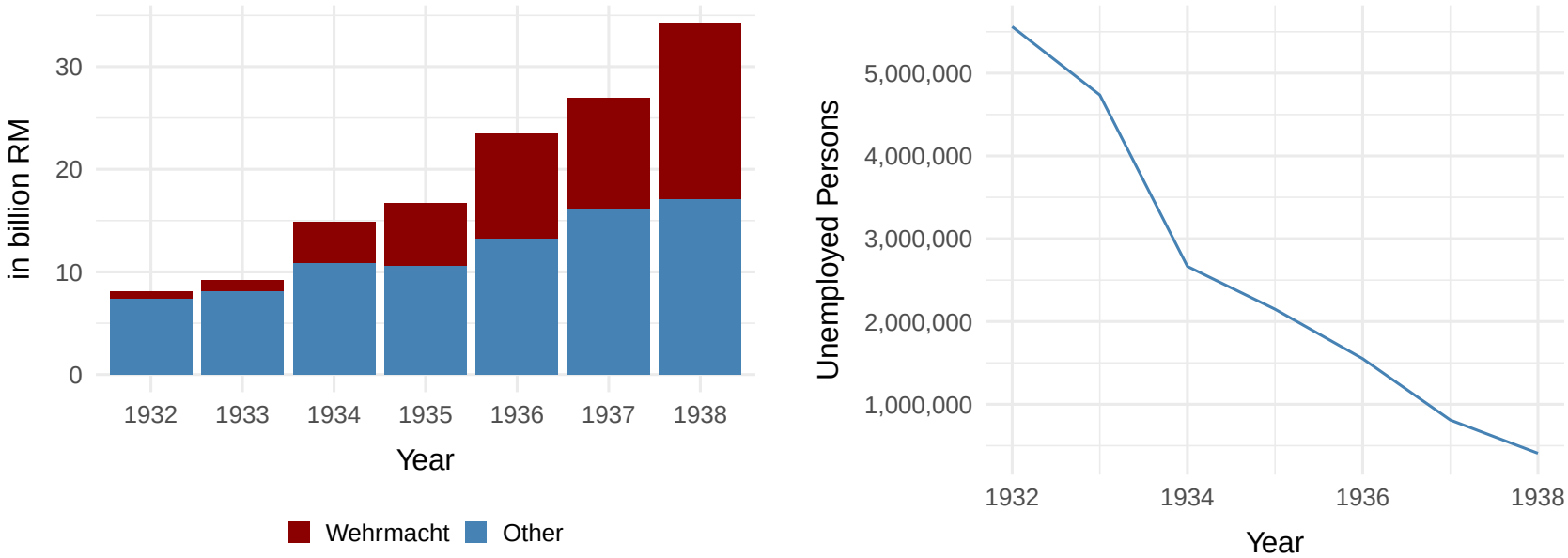


Figure 1: Military Spending and Unemployment, 1932–1938.
Sources: Oshima (1991), *StJB*.

Between 1932 and 1938...

- **Military spending** increased 25-fold
- **Unemployment per capita** fell from about 9% to under 2%

This Paper

I study the effects of **military spending on unemployment** in Nazi Germany between 1932 and 1936

- New data: Archival file of *Luftwaffe* suppliers: contains location of individual plants
- Identification: Exogenous, district-level ($n = 358$) variation of plant presence
- Contribution: Rearmament as a fiscal shock. Role of Nazi policies in German economic recovery Expand

Findings:

$\approx$ 3p.p. relative decrease in districts with Luftwaffe plant
$\approx$ 45% of total decrease between 1932–1936

Historical Background

Nazi Economics: Keynesian Economics?

Authoritarian deficit spending:

- Substantial increase of government expenditure: 18.7% p.a. 33-36 (Barkai 1990)
- Expansion of *domestic* credit supply (Stucken 1964)

Credit Flows

Government debt: Channeling of excess savings (*Kaufkraftabschöpfung*)

- Regulation of private demand: Prices, wages, employment, taxation (Ritschl 1992)
- Private consumption grew by 3.6% p.a. 33-36 (Barkai 1990)
- Excess savings were absorbed into government debt by elaborate **shadow banking system** More

Limited Effect on Living Standards?

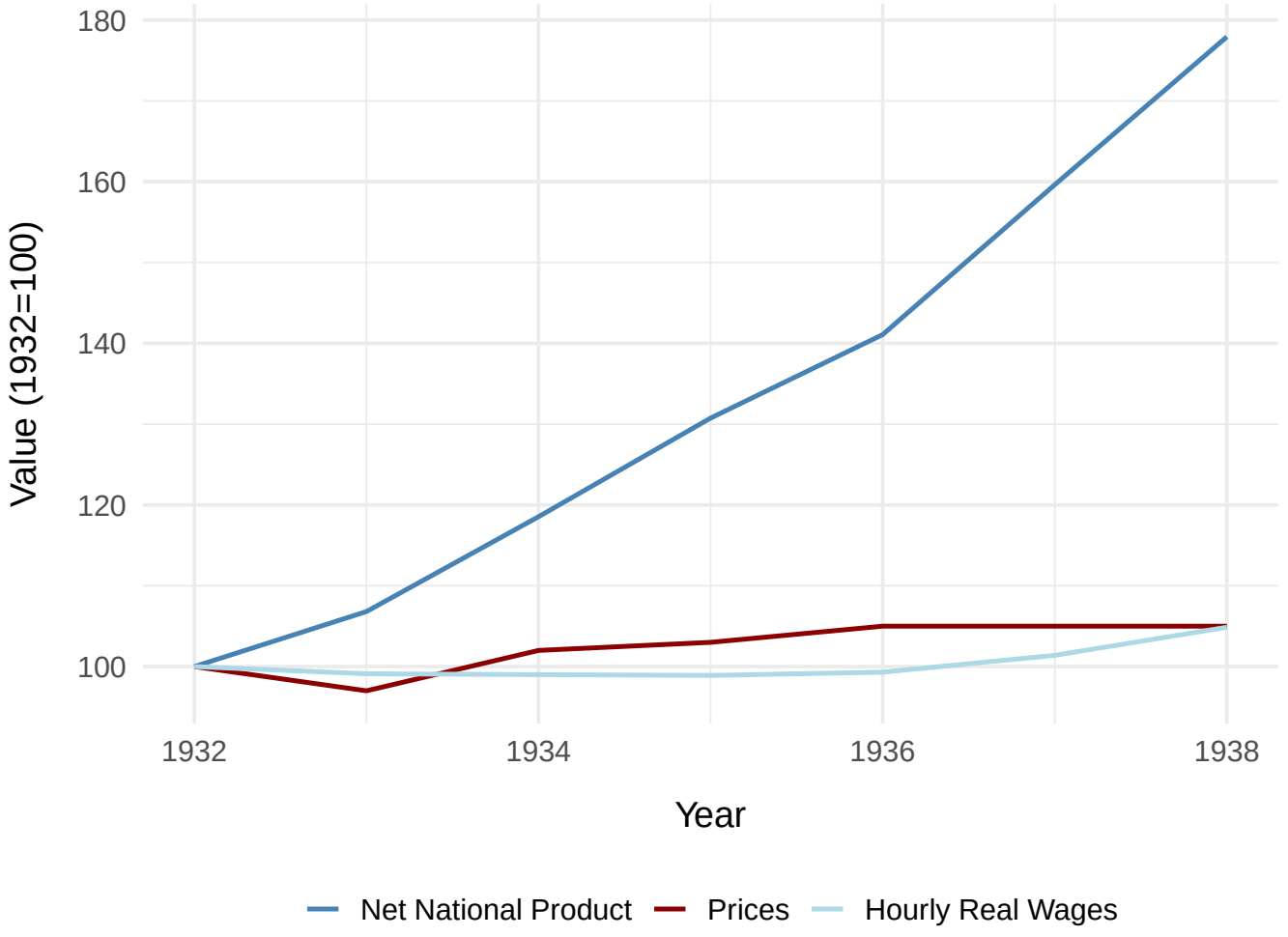
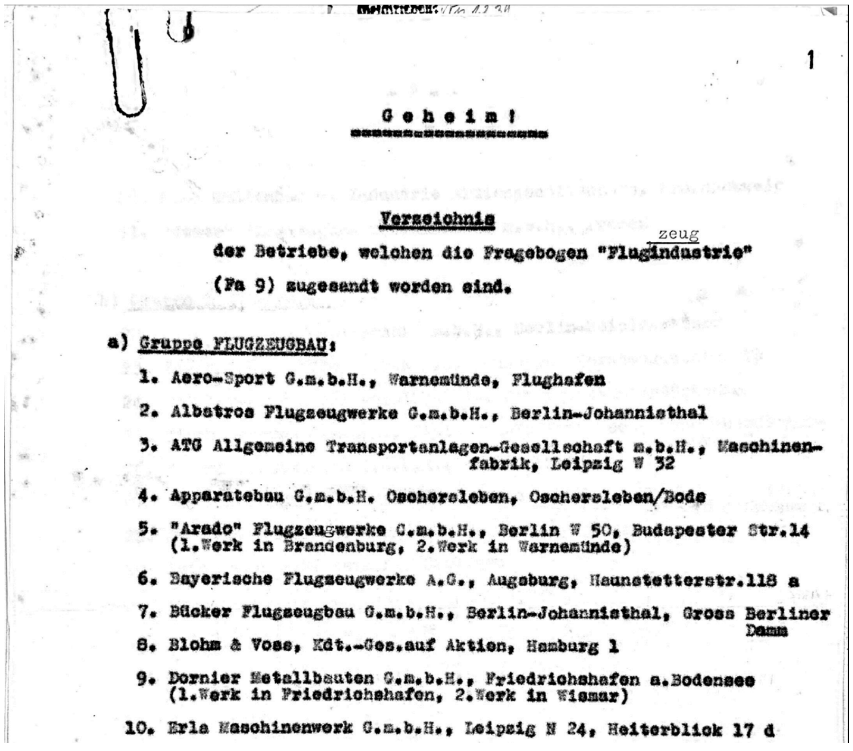


Figure 2: National income, prices and real wages, 1932-1936
Sources: Albers (1976) and *StJB*

Data

Luftwaffe Suppliers: Archival File



1

Geheim!

Verzeichnis

der Betriebe, welchen die Fragebogen "Flugzeugindustrie" (Fa 9) zugesandt worden sind.

a) Gruppe FLUGZEUGBAU:

1. Aero-Sport G.m.b.H., Warnemünde, Flughafen
2. Albatros Flugzeugwerke G.m.b.H., Berlin-Johannisthal
3. ATG Allgemeine Transportanlagen-Gesellschaft m.b.H., Maschinenfabrik, Leipzig W 32
4. Apparatebau G.m.b.H. Oschersleben, Oschersleben/Bode
5. "Arado" Flugzeugwerke G.m.b.H., Berlin W 50, Budapester Str.14 (1.Werk in Brandenburg, 2.Werk in Warnemünde)
6. Bayerische Flugzeugwerke A.G., Augsburg, Haunstetterstr.118 a
7. Bücker Flugzeugbau G.m.b.H., Berlin-Johannisthal, Gross Berliner Damm
8. Blohm & Voss, Kdt.-Ges.auf Aktien, Hamburg 1
9. Dornier Metallbauten G.m.b.H., Friedrichshafen a.Bodensee (1.Werk in Friedrichshafen, 2.Werk in Wismar)
10. Erla Maschinenwerk G.m.b.H., Leipzig N 24, Heiterblick 17 d

Figure 3: BA R3102 / 3666

Confidential!

Registry

of companies, to whom survey “aircraft industry” (Fa9) was sent

Group AIRCRAFT CONSTRUCTION:

- 1. Aero-Sport G.m.b.H., Warnemünde, Flughafen

  ...

- 10. Erla Maschinenwerk G.m.b.H., Leipzig N 24

Luftwaffe Suppliers: Plant Locations

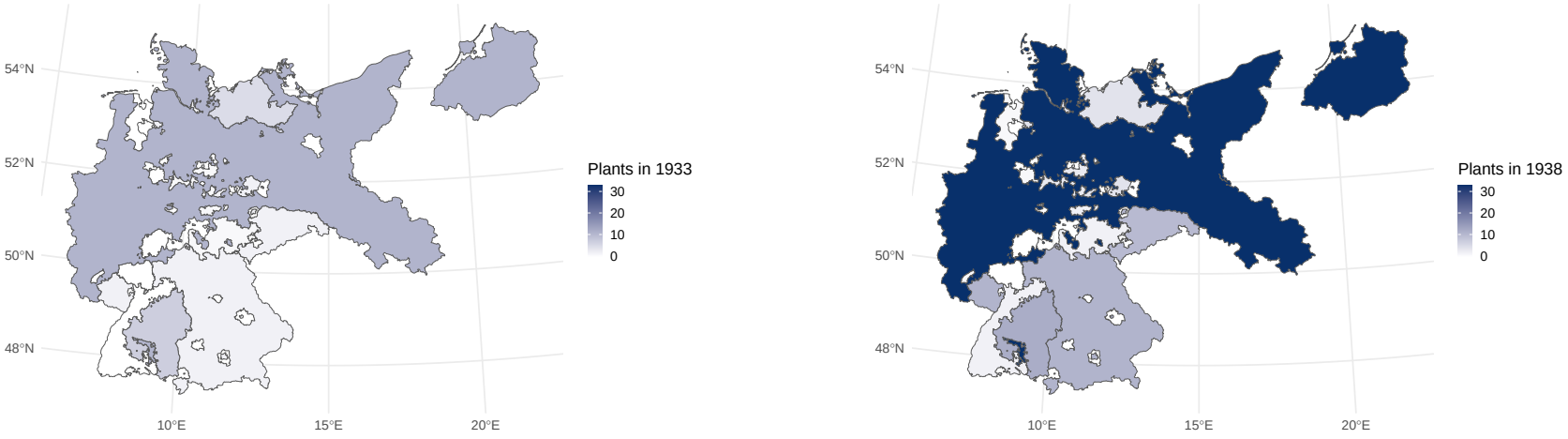
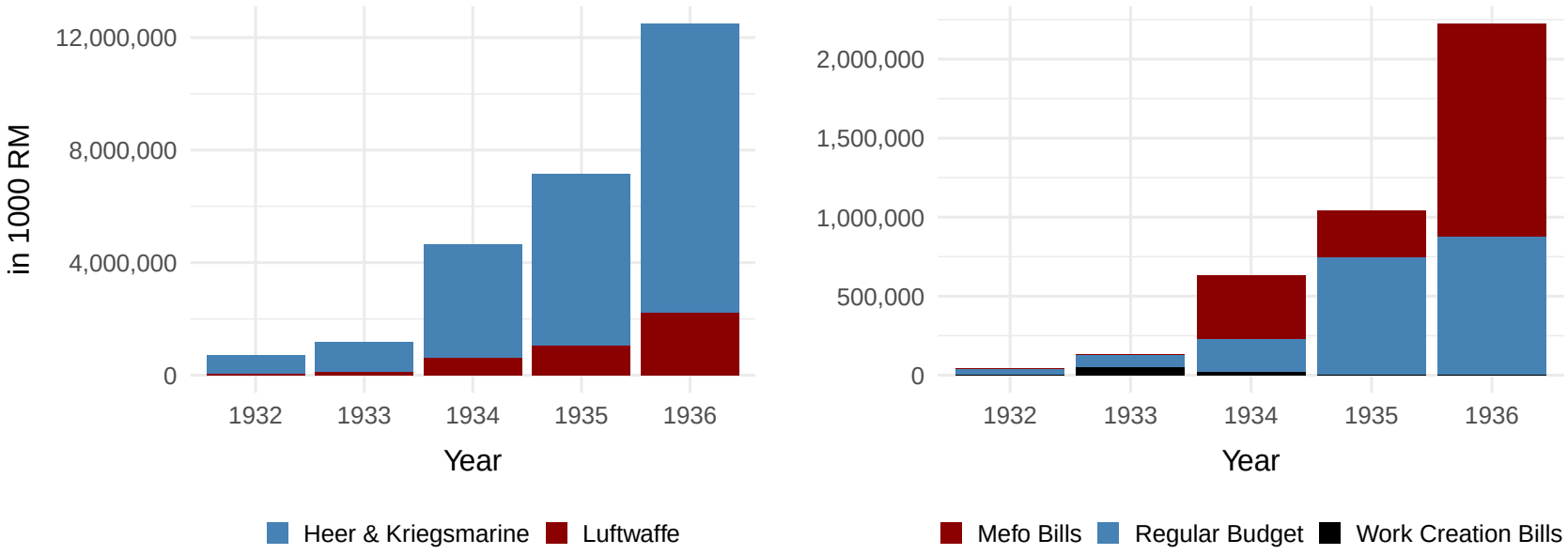


Figure 4: Geographical Distribution of Plants

I use **both**:

- More variation in 1938
- Unclear when they began operating between 1933-38
- Endogenous location choice in 1933? Robustness Check

Luftwaffe Aggregates



(a) Total Military Budget

(b) Luftwaffe Budget Decomposition

Figure 5: Military & Luftwaffe Expenditure, 1932–1936
Source: Oshima (1991)

→ Including shadow budgets essential to avoid biased results

Unemployment

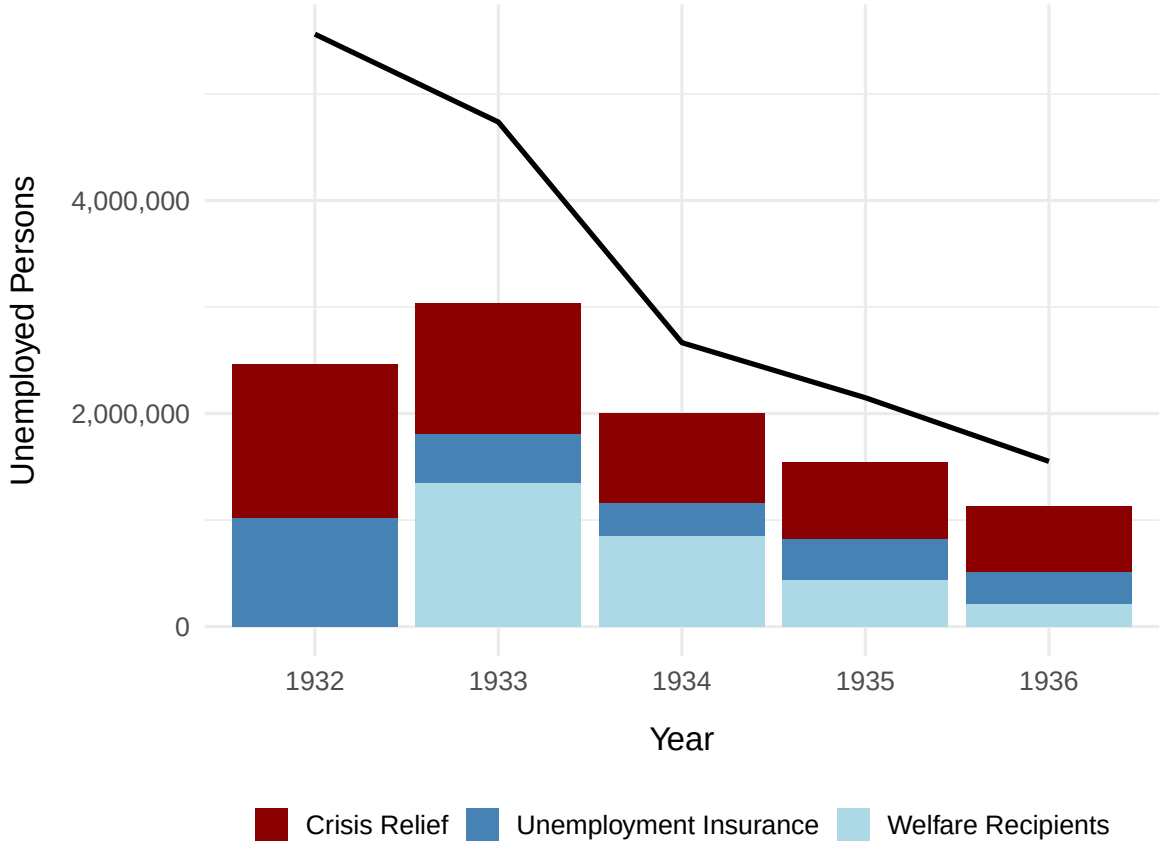


Figure 6: Aggregated District-level Unemployment
Source: Ettmeier et al. (2024) and *StJB*

Empirical Analysis

Building the Exposure Variable

I build a *Luftwaffe exposure variable* that uses aggregate budget fluctuations and plant locations:

$$LW_{dt} = \underbrace{LW_{Reich,t}}_{\text{temporal variation}} \times \underbrace{\frac{Plants_d}{Plants_{Reich}}}_{\text{geographical variation}}$$

Yields **four** possible measures:

- 1933 and 1938 plant distribution
- *Official* and *estimated* (incl. shadow budgets) Luftwaffe expenditure

Expand

Empirical Strategy

Identifying assumption: Nazi military buildup exogenous to relative economic conditions between districts (akin to Nakamura and Steinsson (2014)):

- Then, variations in Luftwaffe exposure allow for causal identification of *relative effect* on unemployment
- I estimate the cumulative effect between 1932 and 1936
- Additional restriction: No district spillover effects

Estimation

I estimate:

$$\Delta U_{dt} = \alpha_d + \gamma_t + \beta \frac{\text{Exposure}_{dt}}{\text{Pop}_{d,1932}} + \epsilon_{dt} \tag{1}$$

where

$$\Delta U_{dt} = \frac{\text{Unemployment}_{dt} - \text{Unemployment}_{d,1932}}{Pop_{d,1932}}$$

α_d, γ_t: District and year fixed effects

$Exposure_{d,t}$: In 1000 RM ($\approx$ 1933 p.c. NI)

$Pop_{d,1932}$: 1932 district population from Ettmeier et al. (2024)

Results: Full Sample

Table 1: Unemployment Relative to 1932

	Official			Estimated[1]		
	Insured	Crisis	Ins. + Crisis	Insured	Crisis	**Ins. + Crisis**
Panel A						
Exposure 1933	-0.0126*	-0.0365*	-0.0491*	-0.0050*	-0.0152*	**-0.0202***
	(0.0065)	(0.0190)	(0.0254)	(0.0028)	(0.0080)	**(0.0107)**
Num. Obs.	1755	1755	1755	1755	1755	1755
R^2	0.892	0.802	0.860	0.891	0.801	0.859
R^2 Within	0.019	0.049	0.049	0.016	0.044	0.043
Std. Errors	District	District	District	District	District	District
Panel B						
Exposure 1938	-0.0178**	-0.0525***	-0.0702***	-0.0073**	-0.0222***	**-0.0295***
	(0.0072)	(0.0183)	(0.0253)	(0.0030)	(0.0078)	**(0.0107)**
Num. Obs.	1755	1755	1755	1755	1755	1755
R^2	0.892	0.805	0.862	0.892	0.804	0.861
R^2 Within	0.024	0.063	0.062	0.021	0.058	0.056
Std. Errors	District	District	District	District	District	District
Fixed Effects	✓	✓	✓	✓	✓	✓

[1] *This includes estimated shadow budgets resulting from Wechsel-circulation.*

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Results: Spending Types, 1932–1936

Table 2: Predicted Reductions in Unemployment per capita

Spending Type	Per Capita (RM)	β_{1933} (in pp)	β_{1938} (in pp)
Luftwaffe	28.66	−0.058	−0.085
Military Total	333.33	−0.673	−0.983
Government Total	1,090.05	−2.202	−3.216

Notes: Coefficients are drawn from models reported in Table 1 using expenditure figures that include shadow budgets. Source: Oshima (1991).

These results imply that, given the overall reduction in unemployment between 1932–1936:

- Military spending could explain up to $\approx 14\%$
- Government spending overall could explain up to $\approx 45\%$

Results: By Year

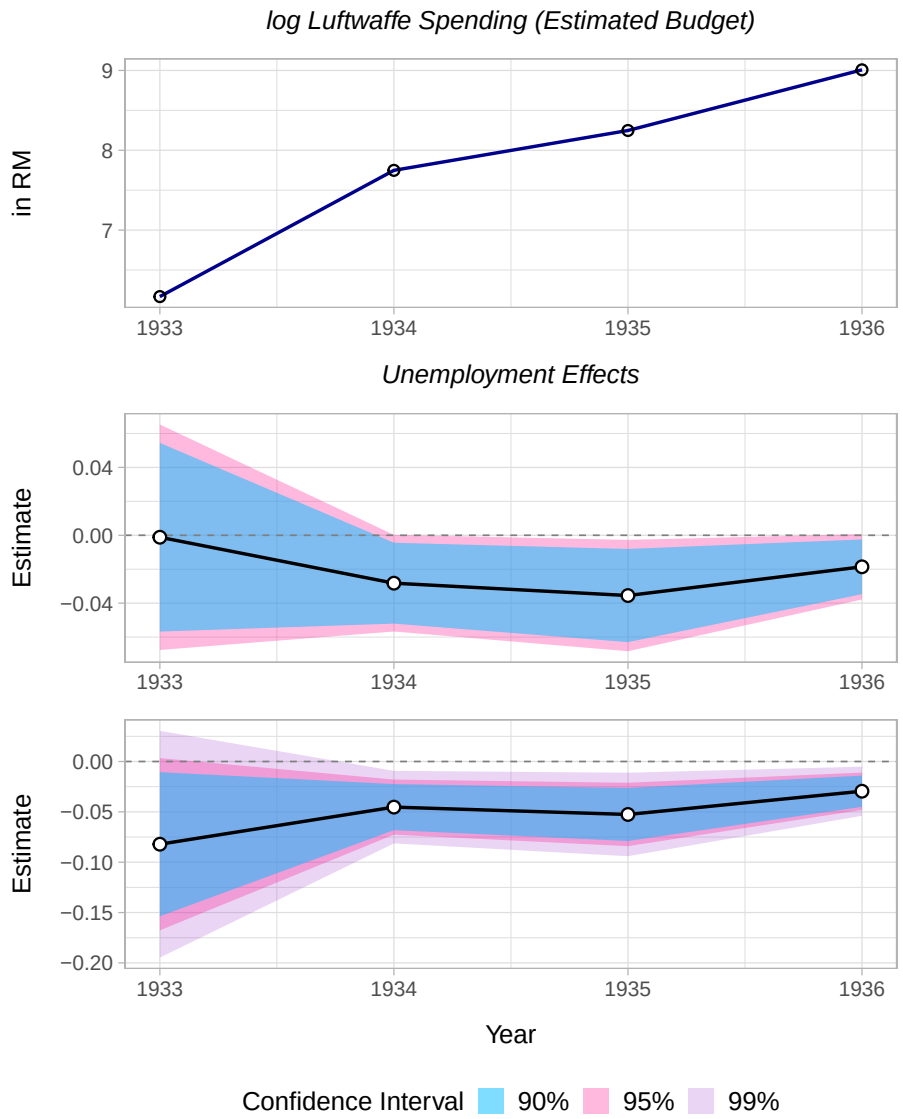


Figure 7: Estimates of Equation 1 by Year

Discussion

Evidence for strong effect of rearmament in accelerating labor market recovery

- New data allows for regional identification strategy
- Result not driven by plant distribution
- Unemployment numbers underreport true level → Conservative estimates

Previous literature debates importance of Nazi economic policies (e.g., Ritschl (2002) vs. Fremdling and Stäglin (2015))
→ 1936 cutoff matters!

Future Research: Firm-level analysis, DiD-estimator more suitable to HAD

Thank You.

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Appendix

Related Literature

Contributions to the Literature

Fiscal Multipliers via Military Spending

- Nakamura and Steinsson (2014): Military spending as exogenous shock
- Mixed evidence internationally:
  - Positive: Auerbach, Gorodnichenko, and Murphy (2019) (US cities)
  - Negative: Malizard (2013) (France)
  - Context matters: Ilzetzki, Mendoza, and Végh (2013)
- Related work: Aircraft production and learning effects (Ilzetzki (2024), Budraß, Scherner, and Streb (2005))

Close

Contributions to the Literature (cont'd)

Effectiveness of Nazi Macroeconomic Policy

- Erbe (1958), Ritschl (2002): limited Keynesian impact due to consumption constraints
- Abelshauser (1999): deficit spending drove rapid recovery. Countered by Buchheim (2001) and Buchheim (2008), Ritschl (2002) – recovery preceded Nazism
- Fremdling and Stäglin (2015): rearmament created 5–9 million jobs; sufficient for full employment
- Broader impacts: propaganda (Voigtländer and Voth (2014)), expectations (Ettmeier et al. (2024))

Supplementary Figures

Credit and Economic Activity, 1933-1936

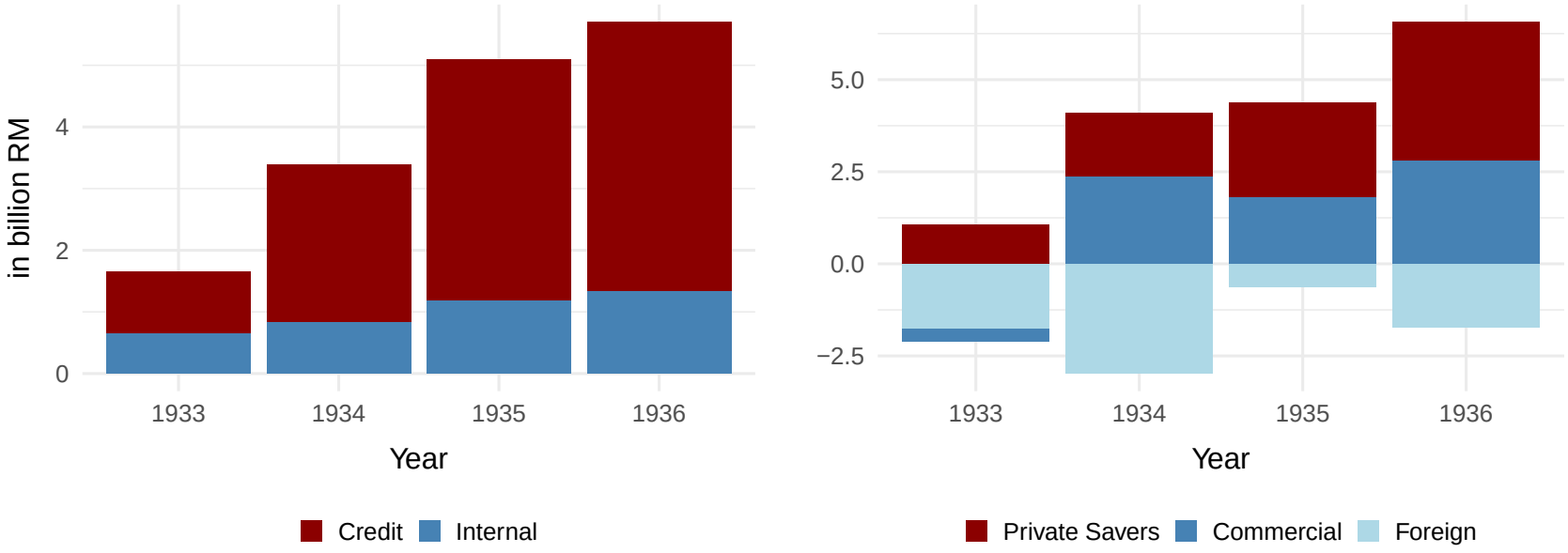

Figure 8: Sources of Public Investment and Credit Flows, 1932–1936
Source: BA R 3102/2700

Back

Credit and Shadow Banking

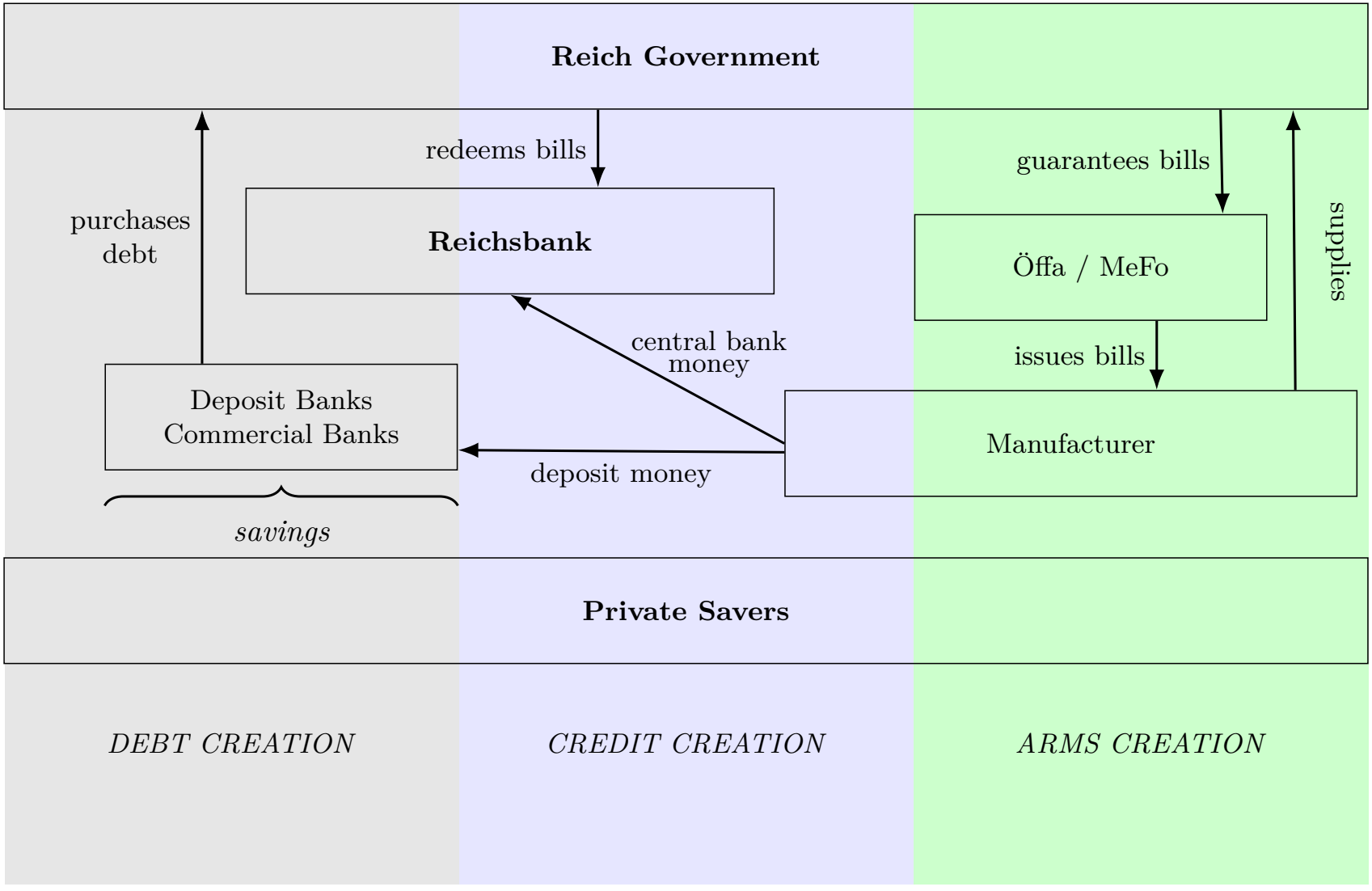

Figure 9: Author's illustration, various sources. Back

Detailed Map: 1933 Plants

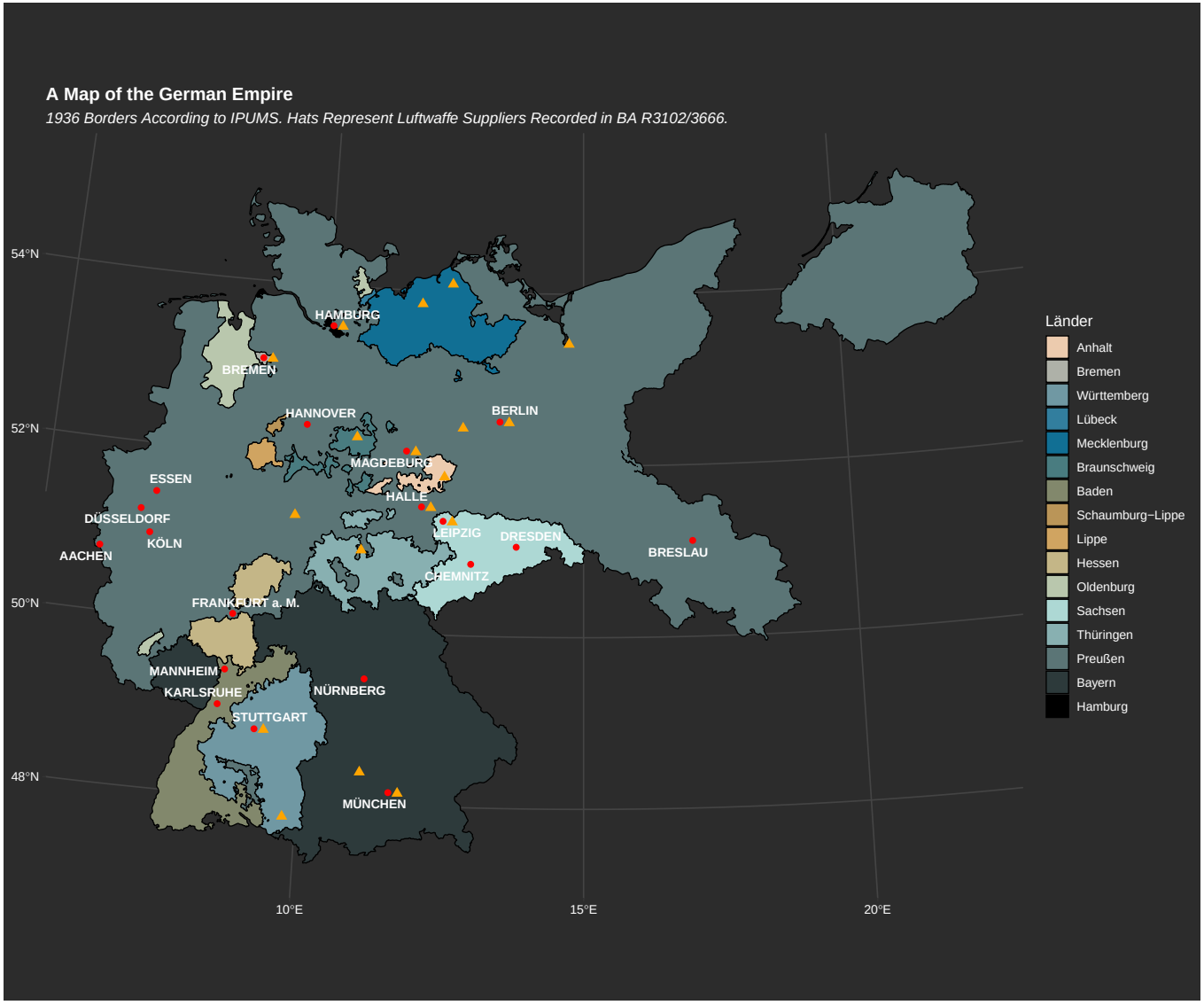

Figure 10: Source: IPUMS

Detailed Map: 1938 Plants

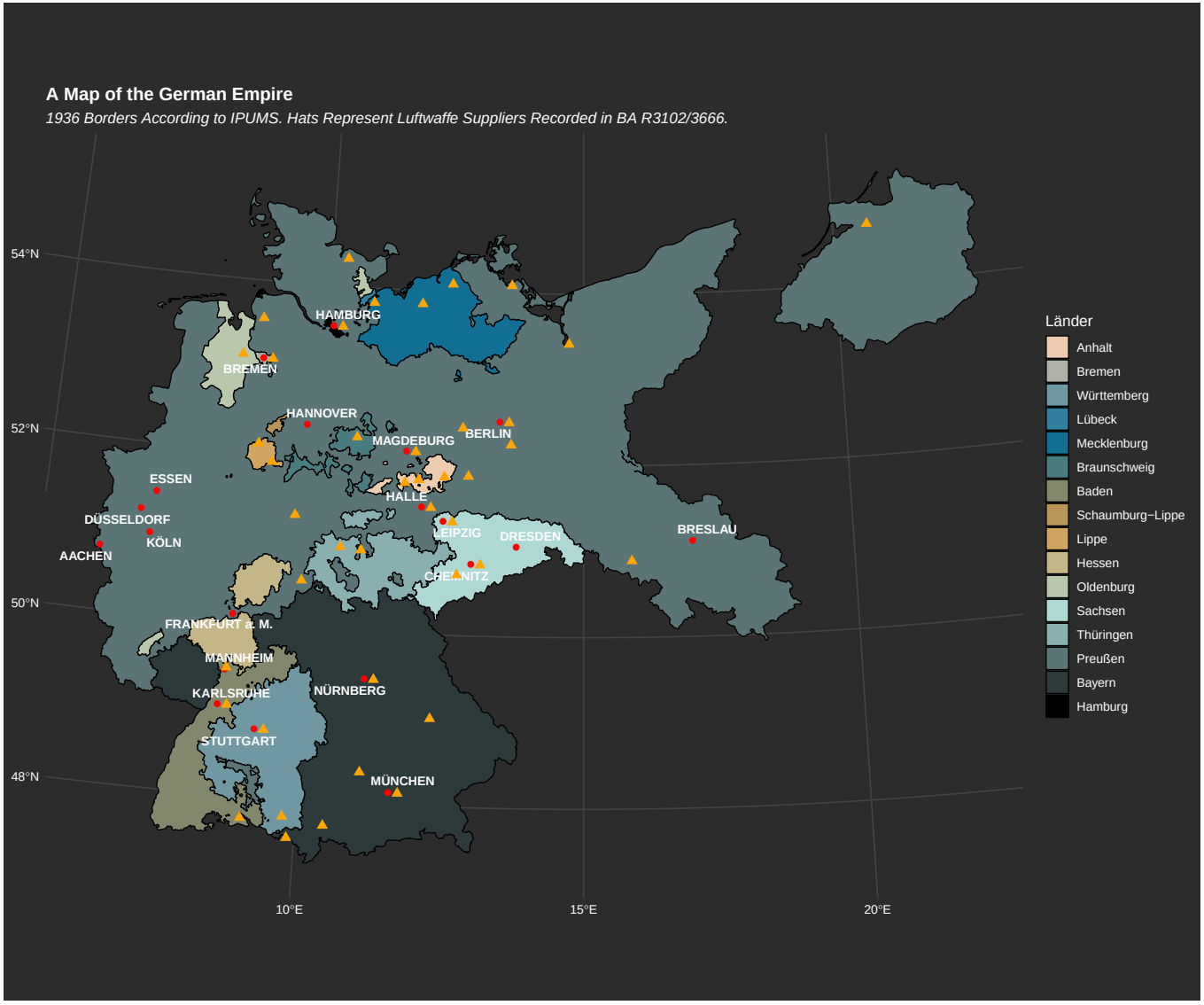

Figure 11: Source: IPUMS

Luftwaffe Exposure by Districts

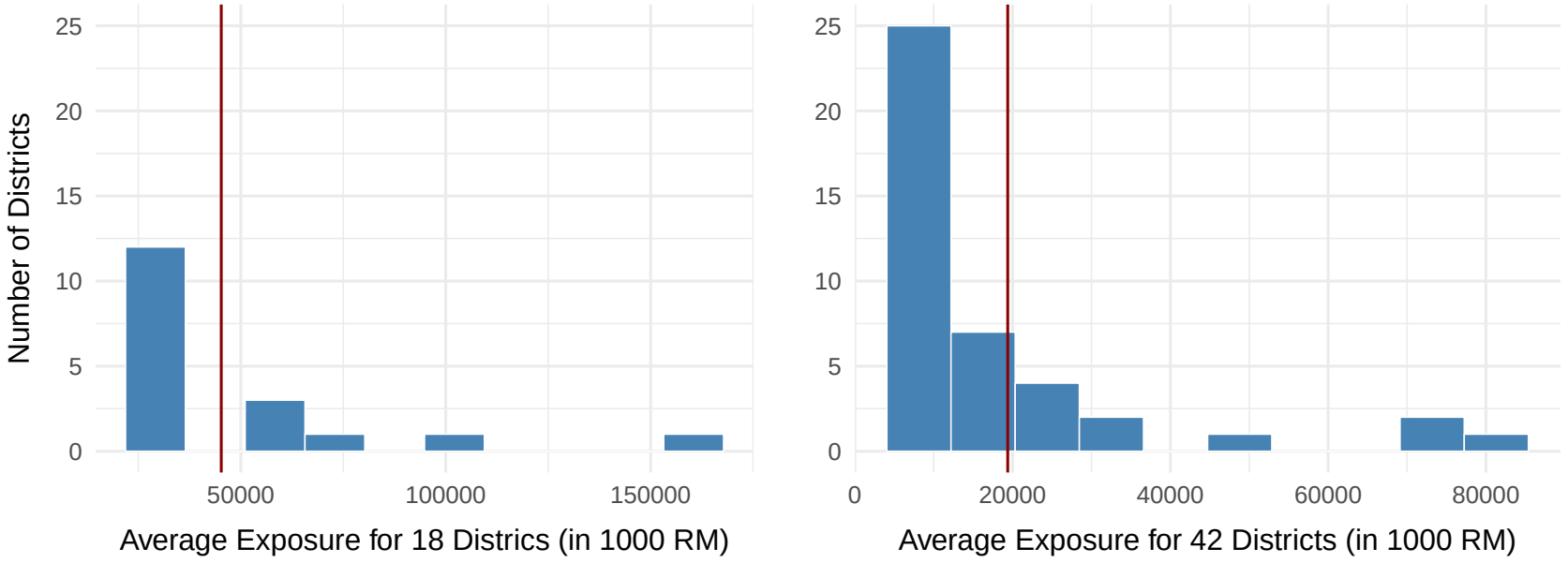

Figure 12: Luftwaffe Exposure, for Non-Zero Districts
Author's calculations

Shown here: *Estimated* total budget. Red line: Mean

Close

Luftwaffe Exposure Visualized

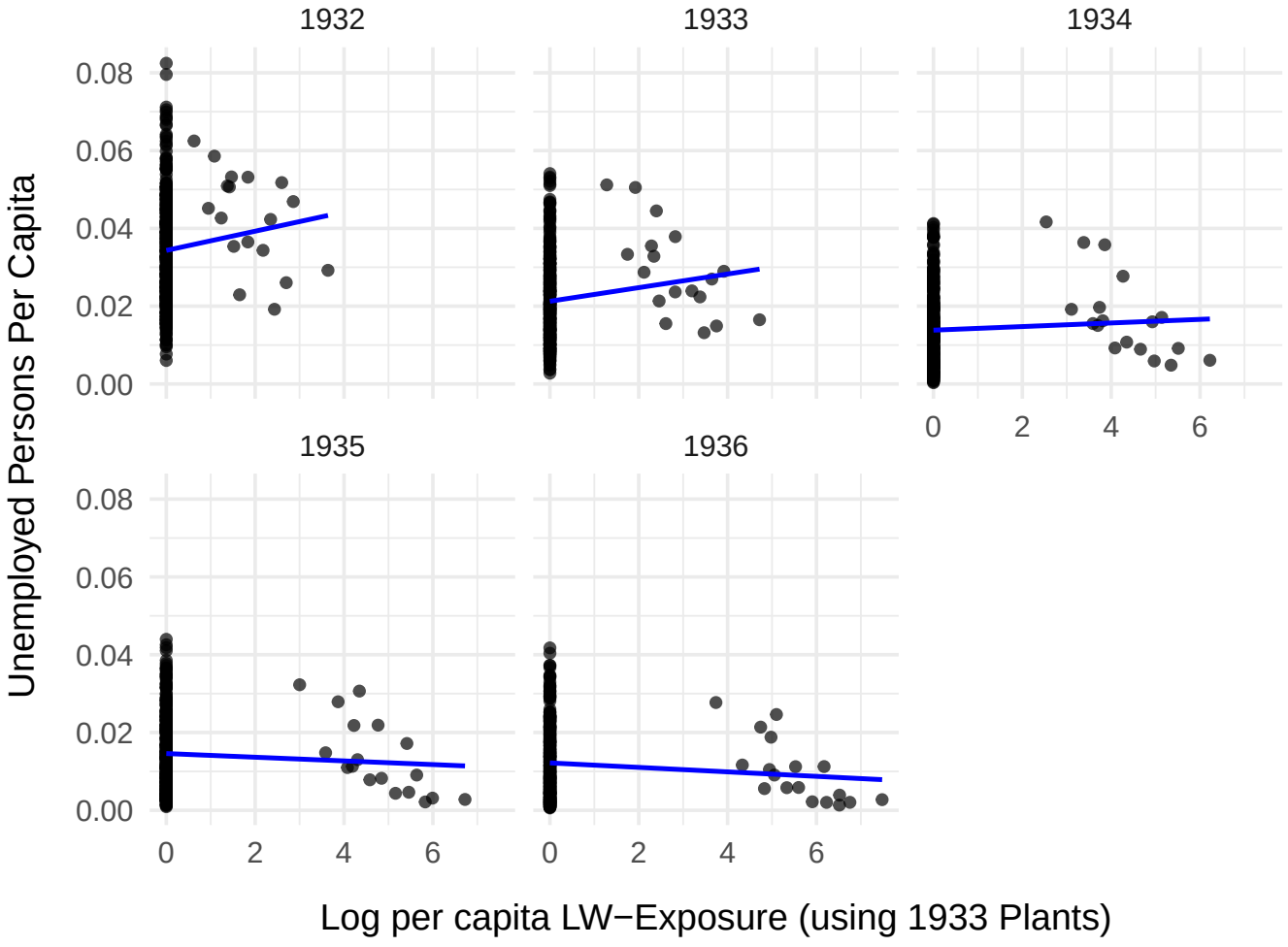

Figure 13: Unemployment and log Exposure, 1933 Plant Distribution
Author's calculations

Luftwaffe Exposure Visualized (cont'd)

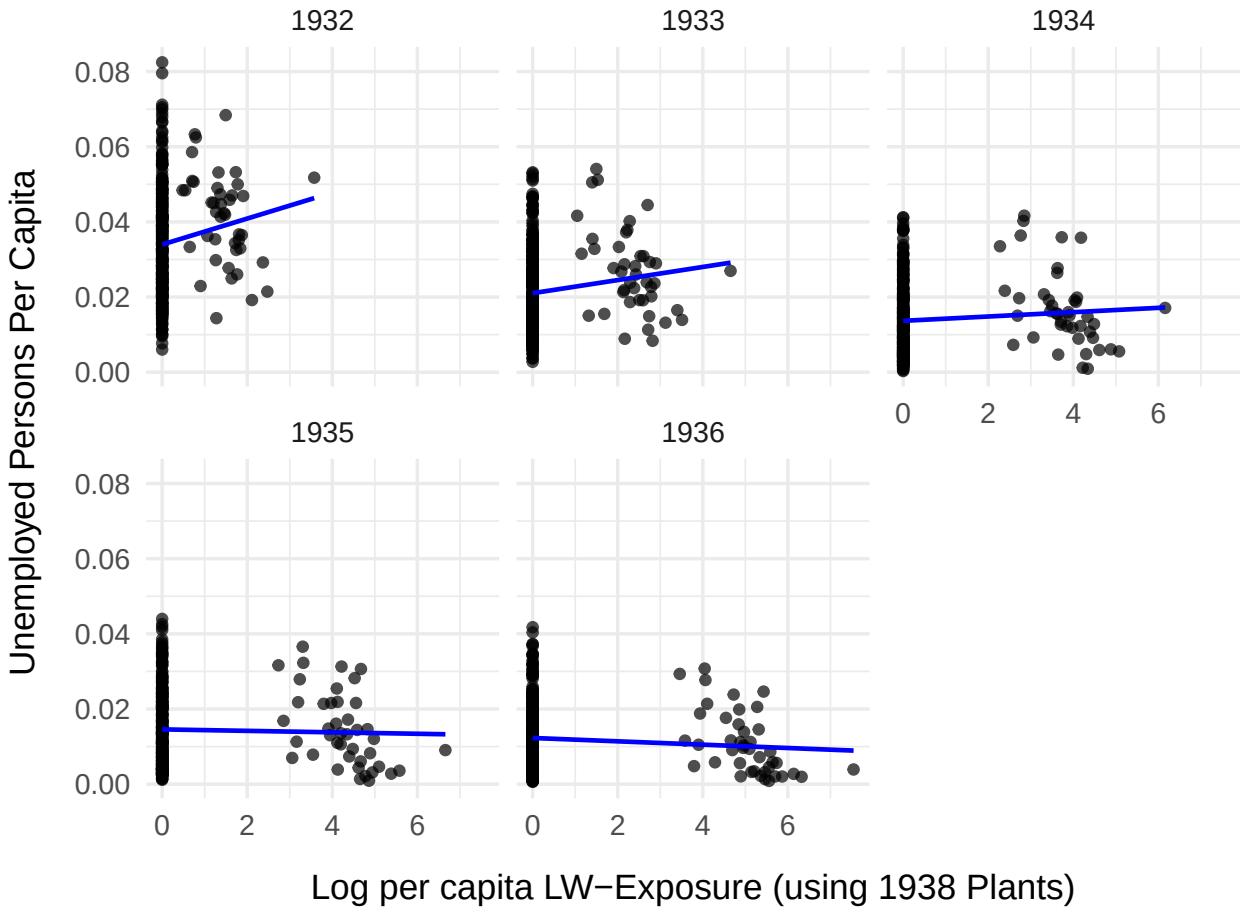

Figure 14: Unemployment and log Exposure, 1938 Plant Distribution

Back

Robustness

Endogeneity

Could plant location decisions be driven by pre-existing economic conditions?

I repeat the estimation of Equation 1 on the *Länder*-level and control for industrial exposure exploiting the regional variation in industrial employment shares:

$$\text{Ind. Exposure}_{lt} = \text{Production Index}_{Reich,t} \times \frac{\text{Ind. Employment}_{l,1933}}{\text{Pop}_{l,1933}}$$

Data: League of Nations (1939), Hohls and Kaelble (1989)

Result: Industrial exposure variable is insignificant and does not affect coefficients. Back

Industrial Exposure and Plants per capita

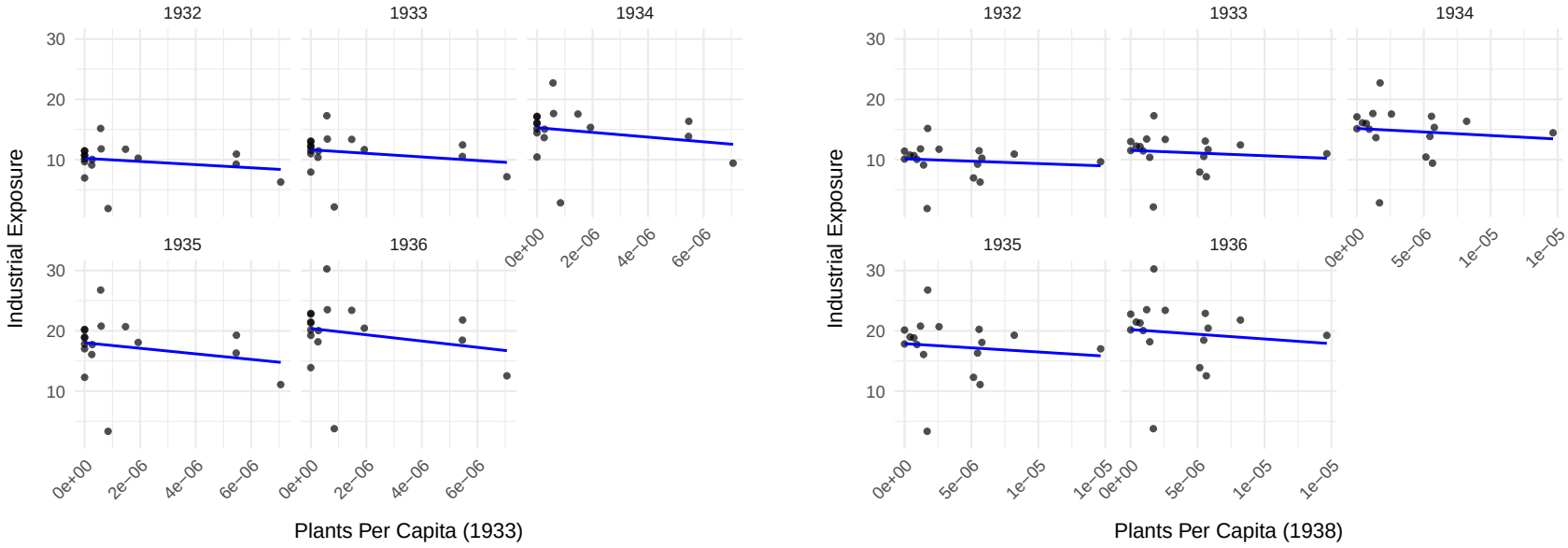

Figure 15: Industrial Exposure and Plants per Capita, Plants 1933 vs 1938

Regression Coefficients (incl. Control)

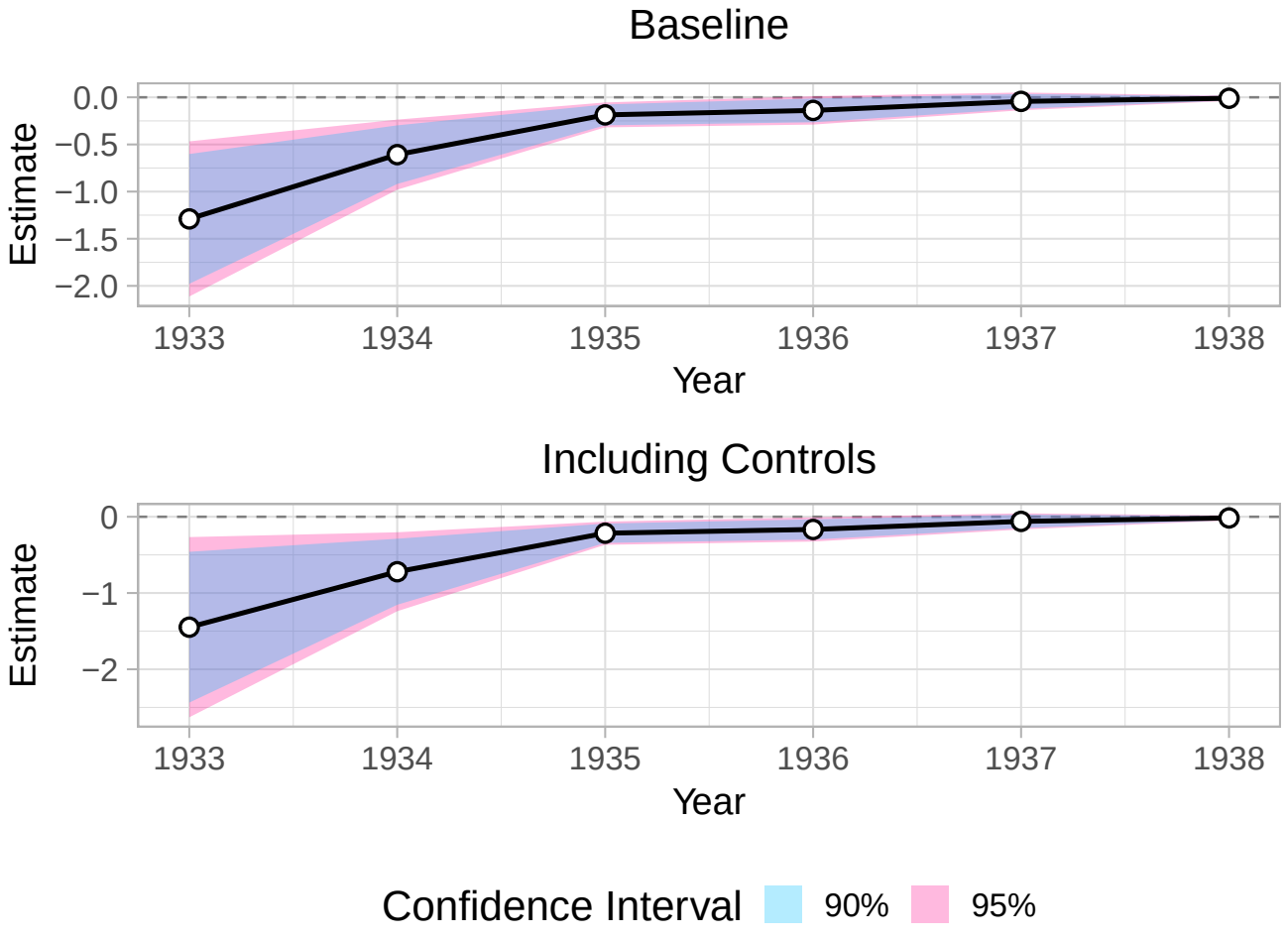

Figure 16: Including Industrial Exposure in Year-on-Year *Länder*-Regression (Plants 1933)

Regression Coefficients (incl. Control)

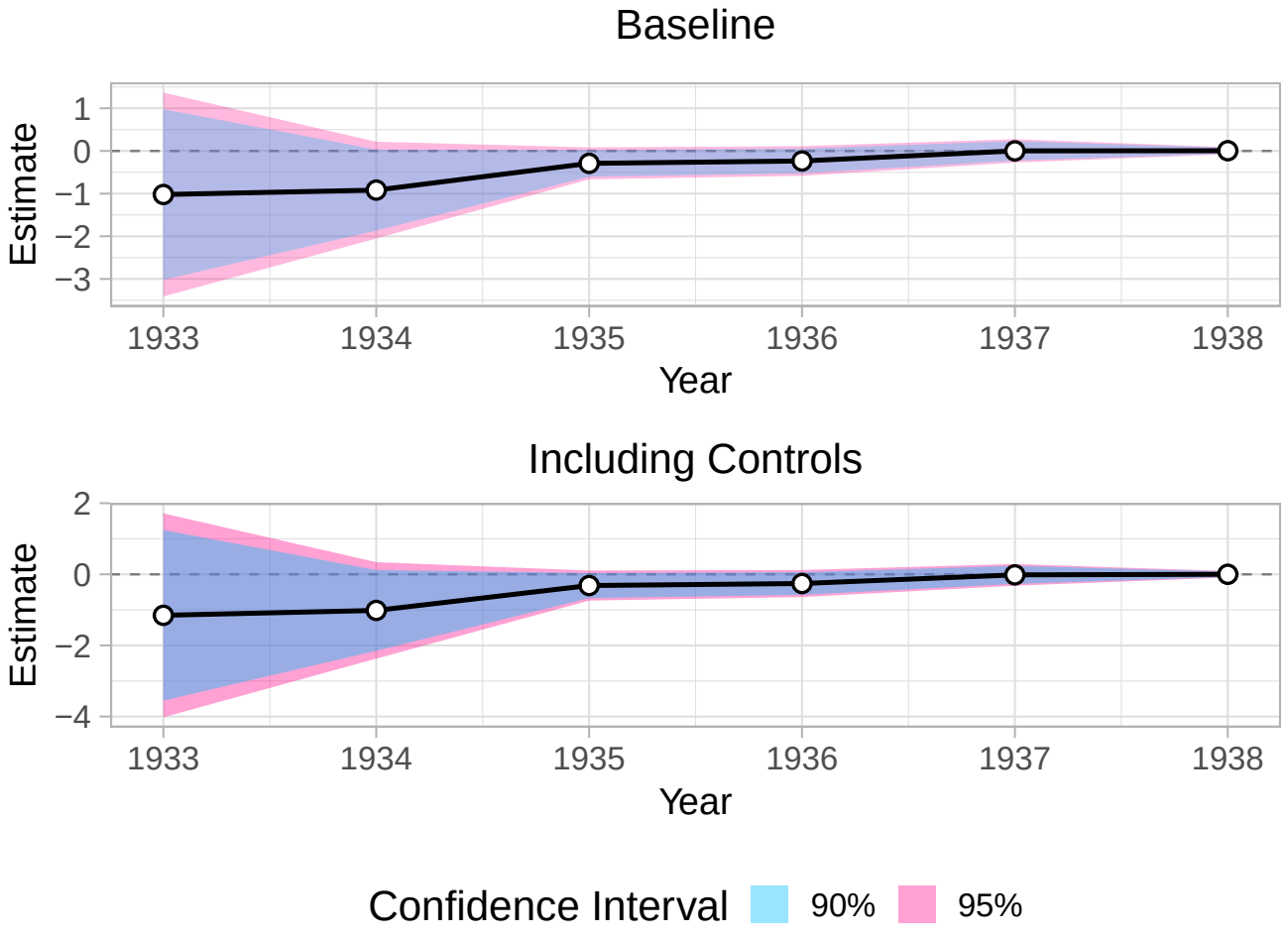

Figure 17: Including Industrial Exposure in Year-on-Year *Länder*-Regression (Plants 1938)