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

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Paris, May 2025

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Für meine Großeltern
A mes grands-parents

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

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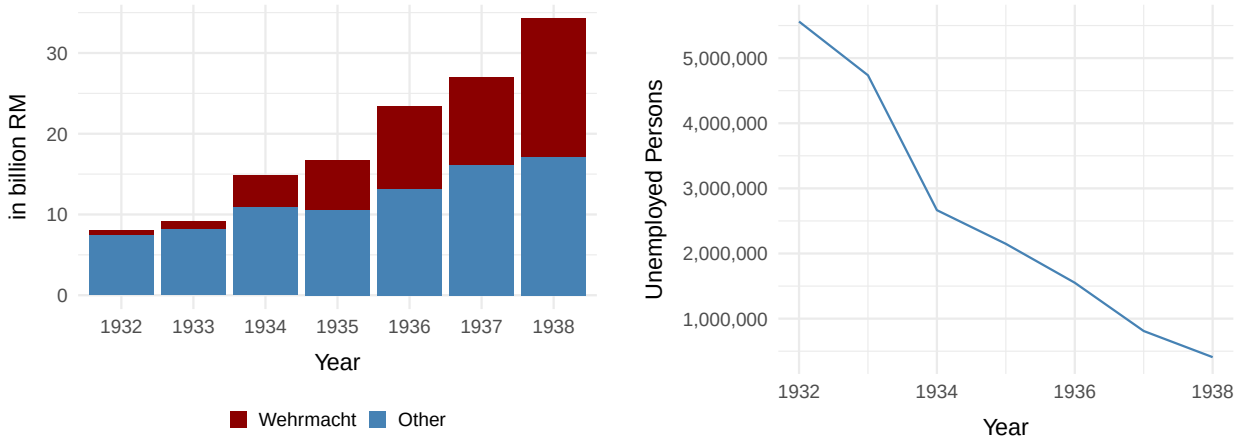
Abstract

Can rearmament boost employment? I estimate the causal effect of military spending on unemployment in Nazi Germany between 1932 and 1936, using novel archival data on the German Luftwaffe. Exploiting cross-district variation in exposure to rearmament, I construct a regional measure of defense spending based on the location of Luftwaffe suppliers. Linking firms to employment districts, I estimate the impact of military procurement on local labor market outcomes. I find that unemployment per capita declined by approximately 3 percentage points in districts with at least one Luftwaffe supplier, relative to districts without. Estimating the effect year-by-year suggest even larger effects of up to 5 percentage points. Overall, the results suggest that Nazi government spending could account for up to 34% of the total reduction in unemployment between 1932 and 1936, approximately one third of which can be attributed to rearmament. (*JEL* C21, E62, H56, J63, N14, N44)

1 Introduction

> *National Socialism has rejected the liberal doctrine of the economy as an autonomous sphere governed by its own laws. It is an integral part of the National Socialist entity and must subordinate itself accordingly. Thus, German economic policy cannot be distinct from the overarching goals of the National Socialist state itself.*
>
> — Dr. Hjalmar Schacht. President of the *Reichsbank*, 1933-1939[1]

From 1933 to 1939, the National Socialist state embarked on an unprecedented buildup of its armed forces, increasing military spending more than 25-fold between 1933 and 1938 (Oshima 1991). Moreover, the German economy, which had undergone a severe recession between 1929–1932, transitioned from mass unemployment to full *employment* by 1936 (Caesar and Hansmeyer (1976)).



(a) Military Spending & Government Expenditure (Oshima 1991)

(b) Unemployed Persons Per Year (*Statistisches Jahrbuch*)

Figure 1: Military Spending and Unemployment, 1932–1938

The case of Nazi Germany is unique not only because of the speed with which the labor market recovered, but also due to the scale of military expenditure it undertook through deficit spending unprecedented for peacetime economies. Nazi economic policy defined full employment as a policy priority to channel vast economic resources into its military buildup, and did so by gradually eliminating market-based principles and institutional frameworks (Barkai 1990, Boelcke 1992). Most importantly, the economy as a

[1] Hjalmar Schacht. *Ziele deutscher Wirtschaftspolitik*. Deutsche Sparkassenzeitung, 1934. In: BA R2501/1760. Author's translation.

whole was subordinate to the Nazi administration, which executed its policies without any political or parliamentary constraints. The increase in public expenditure was paired with a strict supervision of prices and wages, as well as a rationing of private consumption. Private investment – or private economic activity in general – was subject to the authority of the Nazi state (Ritschl 1992).

This paper investigates the response of unemployment to variations in military spending in Nazi Germany. To assess how rearmament contributed to the rapid recovery of the German labor market, I combine existing historical and statistical sources with new archival data on the German air force, the *Luftwaffe*. I use a confidential list of Luftwaffe suppliers, which were recorded in a survey by the Reich Statistics Office (*Statistisches Reichsamt*, StRA) in 1933 and 1938. Exploiting their geographical distribution, I construct a regional military expenditure exposure variable, which I combine with district-level unemployment data from Ettmeier, Kriwoluzky, Papadia, et al. (2024). This allows me to identify the *relative* regional effect of military spending on unemployment between 1932 and 1936.[2] I argue that districts hosting a Luftwaffe supplier responded differently to changes in military expenditure compared to those without such exposure. Specifically, I find that districts exposed to the Luftwaffe experienced a statistically significant reduction in unemployment of approximately 3 percentage points. Overall, Nazi government spending may account for up to 34% of the observed decline in unemployment between 1932 and 1936, with military expenditure alone contributing around 10%.

Importantly, I demonstrate that my measure of Luftwaffe exposure is unlikely to be driven by pre-existing industrial characteristics at the regional level, which might otherwise suggest endogeneity if supplier locations were selected based on local economic conditions. This supports the validity of my identification strategy, treating Luftwaffe supplier presence as an exogenous shock to government spending. Additionally, given that official unemployment figures during this period likely underreport true unemployment, my estimates should be interpreted as lower bounds.

This paper contributes to the existing literature by presenting a new data source, which allows for an identification of regional stimulus effects of defense spending, inspired by work from Nakamura and Steinsson (2014). Investigating economic effects of rearmament in Nazi Germany is notoriously difficult, as much archival material pertaining to its military expansion has likely been forcefully destroyed during or by the end of

[2]Henceforth, *military spending* is used interchangeably to refer to my exposure variable constructed from data on Luftwaffe spending, which will be detailed below. *District* and *Employment District* will also be used synonymously.

the war. Detailed accounts of German military production are available only starting in about 1938–1939 (see Wagenführ 1954, Tooze 2006). By exploiting the geographical distribution of Luftwaffe suppliers, I aim to estimate rearmament-related stimulus effects for the period *before* full employment had been reached by around 1936. I am, to the best of my knowledge, not aware of any previous papers that estimate regional defense spending effects on unemployment for the Nazi German case. In doing so, I contribute to the ongoing debate over the role of rearmament in Germany's economic recovery by providing causal evidence that military spending, instrumented through the Luftwaffe supplier network, significantly accelerated labor market improvements, and, in turn, contributed to the German upswing as a whole.

2 A Brief Overview of Nazi Economics

Nazi economic policy cannot be fully understood without reference to the severe recession Germany experienced between 1929 and 1933, which played a crucial role in creating the social and economic conditions that enabled the rise of the Nazi Party. Between 1929 and 1932, real national income shrank by about 25% (Albers 1976). Unemployment reached an estimated six to eight million at its peak (*Statistisches Jahrbuch*, Spoerer and Streb 2013). Moreover, the German economy had borrowed heavily from foreign creditors during previous years, which, after the Great Depression, led to a sudden and rapid reversal of capital inflows. This led to the collapse of the banking sector and prompted the introduction of capital controls in 1931 (Schnabel 2004). Public borrowing came to a near standstill, and domestic credit markets froze. As a result, economic activity contracted sharply, which reduced Germany's fiscal revenue, while the surge in unemployment precipitated higher welfare expenditures. The German government under chancellor Heinrich Brüning responded with a variety of austerity measures, cutting public spending and increasing taxes (Ettmeier, Kriwoluzky, Schularick, et al. 2024). A popular Nazi campaign slogan at the time was *"Arbeit und Brot"* – labor and bread.

Overall, Nazism did not elaborate a distinct economic ideology or theory. The key element was that the economy was subordinate to the objectives of the National Socialist state and the *Führer*. Many economic policymakers from the Weimar era continued to serve under the Nazi administration, including Hjalmar Schacht (Barkai 1990). It relied on stimulating public demand while simultaneously maintaining a strict control over economic processes to limit inflation risks (Albers 1976, Boelcke 1992). The contradictory

nature of these two objectives was balanced by large-scale government control and interventionism. Thus, Nazi economic policy can be characterized by two pillars.

The first is a vast expansion of *debt-financed* government spending: Figure 2 shows the evolution of Reich government debt by year.[3] Debt was oriented away from foreign creditors into medium- and long-term obligations held domestically (Stucken 1964, Banken 2020). This is also illustrated in Figure 3, which decomposes the credit sources of public investment in the Nazi economy from 1933–1936, according to a confidential document by the StRA.[4] Not only was public investment predominantly financed by an expansion of credit (panel *a*), it was also directly linked to credit supplied by private domestic savers, that is, deposits and insurances (in red, panel *b*), while foreign credit experienced a sharp net outflow:

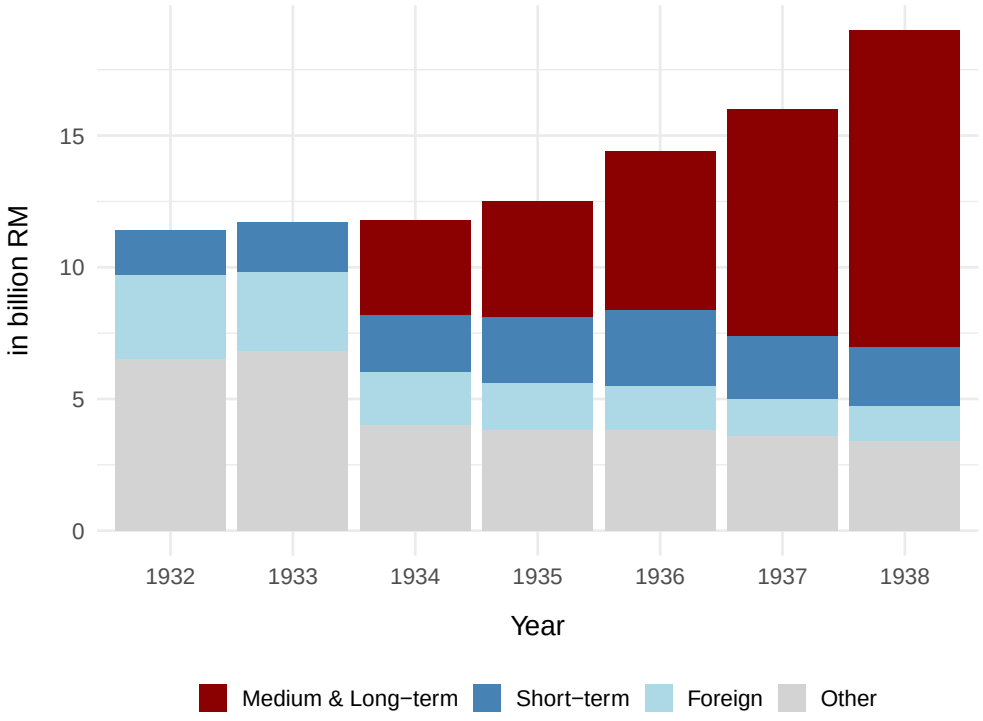
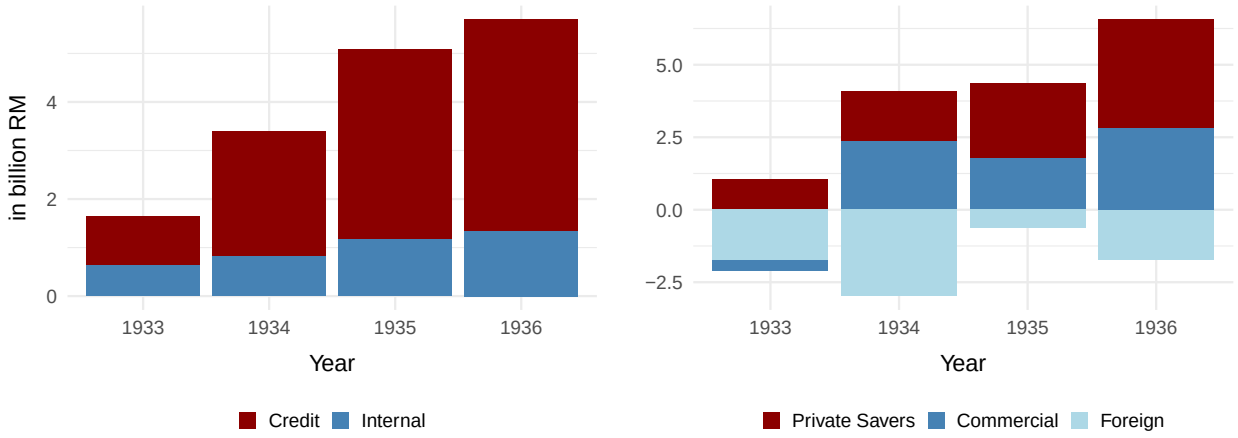


Figure 2: Components of Reich Public Debt

[3] *Statistisches Handbuch von Deutschland*, p. 555, *Reichshaushalt, Reichschsschuld und Notenumlauf*.
[4] *BA R 3102/2700*



(a) Sources of Public Investment

(b) Annual Changes in Credit Flows

Figure 3: The Financing of Economic Activity, 1932–1936

This was a direct consequence of the second pillar of Nazi economic policy, which was the gradual dismantling of market-based economic mechanisms to absorb purchasing power from the private sector and place it into government debt. This was done in two ways.

First, government intervention and regulation served to stimulate the economy while limiting the response of *private* demand and containing potential inflationary dynamics (Boelcke 1992). As soon as economic activity increased and unemployment fell, the government, particularly the Ministry for Economic Affairs (*Reichswirtschaftsministerium*), began strictly regulating prices, wages and private corporate management. Especially agricultural goods were subject to the oversight of a price commissioner, wages could no longer be negotiated autonomously as unions were effectively banned, firms could no longer decide whom to hire or fire, corporations could no longer pay dividends, and workers were no longer freely able to switch employers (Boelcke 1992, Ritschl 1992). However, the economic rebound was so strong that, despite these measures, upward pressure on prices and wages nevertheless emerged, leading to shortages and the rise of black markets – underscoring the speed with which the German economy approached full employment (Caesar and Hansmeyer 1976). Similarly, foreign trade, which had been governed by strict capital controls and bilateral clearing agreements since the 1931 banking crisis, was reduced as efforts were made to relocate production of war-relevant goods and materials into Germany (Ritschl 1992). To maintain control over the price level and the *Reichsmark*, foreign currency circulation was placed under the direct supervision of

the Reichsbank, as reserve levels were constantly and critically low and largely used for essential raw material imports (Stucken 1964).

Combined, this limited the growth of private consumption despite the economic upswing. Albers (1976) argues that increased employment did not result in higher real wages during the early 1930s, while consumption was depressed by rationing, taxation[5] or the deterioration of the quality of goods, thus having virtually no effect on living standards. According to Barkai (1990), between 1933 and 1936, public expenditure rose by 18.7% *per year*, while private consumption only rose by an annual 3.6%. Ritschl (1990) estimates that private consumption reached pre-Great Depression levels only in 1936. Figure 4, expressed in 1932 prices and levels, shows that despite sustained growth in real net national income, prices and real hourly wages grew by barely 5% by 1938. Real hourly wages returned to pre-Great Depression levels only between 1936 and 1937.[6]

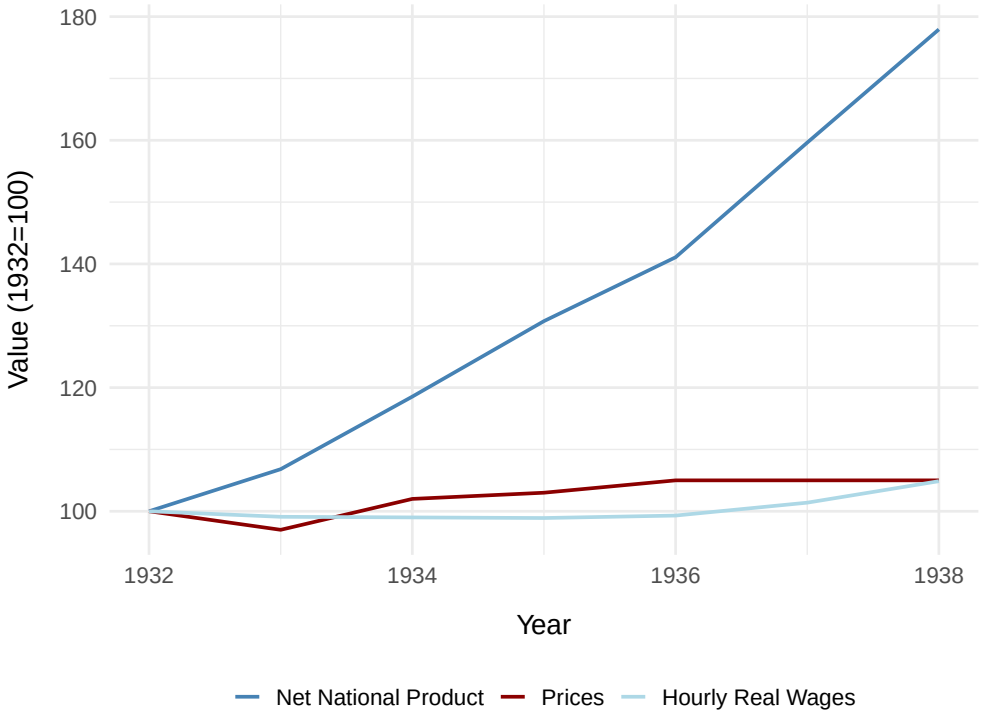


Figure 4: National Income, Prices, and Wages

[5]Indeed, the Nazi administration maintained most tax rates from the Brüning deflationary era. Some consumption and income tax rates were even increased (Ritschl 1992).

[6]NNP: Albers (1976). Prices and wages: *Statistisches Handbuch von Deutschland*, p. 463, *Reichsindexziffern für die Lebenshaltungskosten*, and p. 472, *Indexziffern der Arbeitsverdienste*.

Second, the Nazi state established an elaborate system of shadow banking to siphon purchasing power to finance work creation and rearmament by absorbing excess savings through the financial system.[7] As individuals had few opportunities to consume and corporations few opportunities to invest, savings were channeled into the remaining asset which the Reich was happy to supply in abundance: government debt (Oshima 2006). Through a framework called the *Geräuschlose Methode*, or *silent method*, the Nazi state created a closed credit cycle through which all private and non-state economic actors became, directly or indirectly, creditors of the Reich (Caesar and Hansmeyer 1976). This served to conceal the true nature of government (notably military) expenditure. While a comprehensive treatment of this opaque system lies beyond the scope of this paper, several key elements are necessary to grasp the full extent to which the Nazi state directed the economy to finance its military objectives. [8]

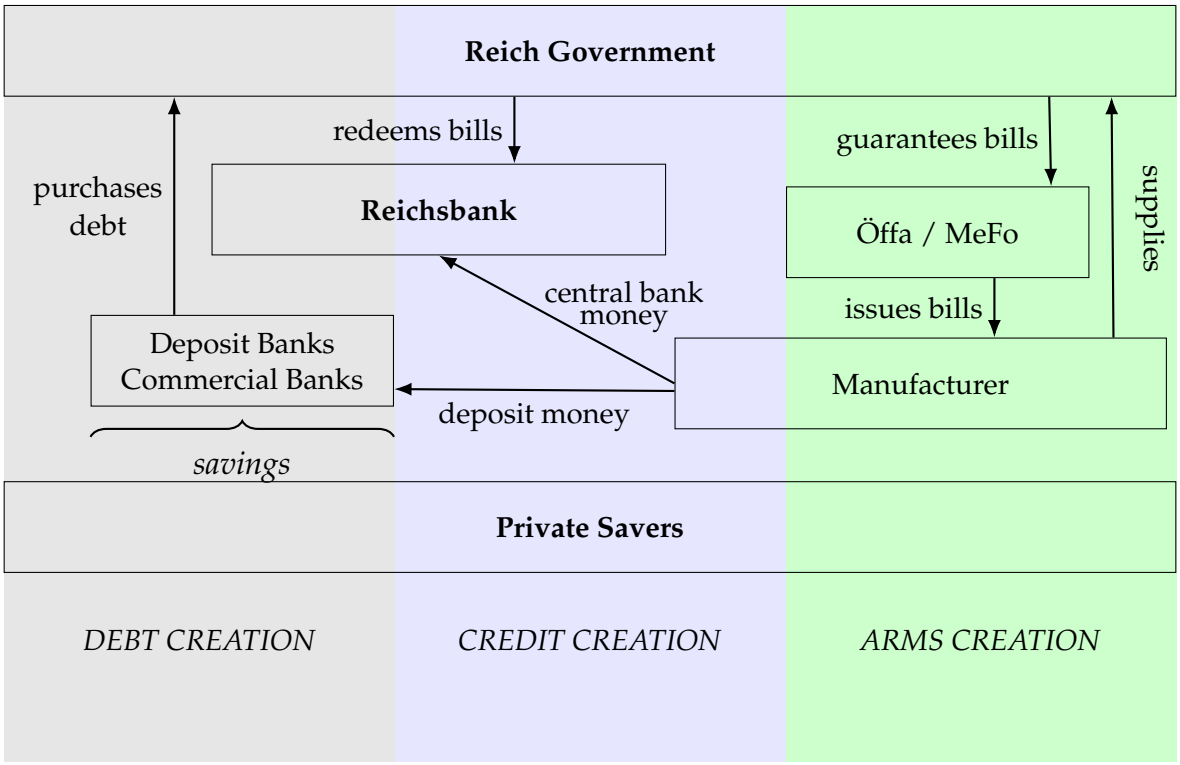


Figure 5: Shadow Credit in the Nazi Economy. Author's Illustration

[7] To quote an internal Reichsbank document: *"Every nation must save, and a nation with extraordinary tasks especially so."* BA R2501/7132, author's translation.

[8] This section is based on Grebler (1937), Stucken (1964), Caesar and Hansmeyer (1976), Oshima (1991), and Oshima (2006).

A simplified illustration is provided in Figure 5. The key instruments used were specifically created bills, known as *Wechsel*, issued by shadow companies that only circulated in the financial system.

Between 1932 and 1937, the Nazi government invested into work creation programs by emitting work creation bills through various government subsidiaries, notably the *Deutsche Gesellschaft für Öffentliche Arbeiten*, or *Öffa*. These bills were used by the *Öffa* to pay for work creation-related projects, such as construction or infrastructure. Immportantly, these bills were guaranteed by the Reich, making them eligible for discounting at the Reichsbank. Hence, bills were stored by the Reichsbank or commercial banks as a liquid asset. [9] Oshima (1991) estimates that around 5 billion RM were invested in work creation programs, 37% of which was financed through work creation bills.[10]

The same principle was used to finance rearmament by creating a fictitious company, the *Metallurgische Forschungsgesellschaft mbH*, which emitted *Mefo-bills*. These bills had a three-month maturity, but were often extended up to five years.[11] An arms contractor would receive Mefo-bills as payment, which could then be discounted for cash at the Reichsbank or deposited at commercial banks. The Reich would then use revenue from emitting government debt to redeem those bills at the Reichsbank once matured. This meant that a large part of government expenditure was financed by shadow debt instruments outside official government accounts. Oshima (1991) estimates that *Mefo*-bills accounted for 60-70% of Wehrmacht expenditure between 1934 and 1937.

The Nazi economy was, thus, geared towards military conflict from the beginning. The initial focus on reducing unemployment was a strategic consideration to channel the productive forces of the German economy into the ultimate goal of rebuilding its military, to which full employment was both a practical and ideological *means*.[12] In one of his

[9] These instruments were, however, no Nazi invention, and many work creation programs had already been passed under the previous von Papen and von Schleicher governments by 1932. The Nazis did, however, use *Wechselfinanzierung* at an unprecedented scale with full cooperation of the Reichsbank.

[10] *Tabelle 15, Arbeitsbeschaffungsmaßnahmen der Reichsregierung.*

[11] In theory, the Reich was supposed to use this system as a temporary instrument, and finance military expenditure through regular government revenue in the medium term. By 1939, billions worth of such bills were scheduled to be repaid by the Reich. Hitler, however, had no intention of doing so, which led to the resignation of the Reichsbank board the same year.

[12] This becomes abundantly clear from internal Reichsbank documents, for instance BA R2501/7132 or R3102/2482, which elaborate how the Reichsbank saw itself as an integral component to fulfilling the goals of the National Socialist state by catering the credit supply to its “needs". See also Barkai (1990) and Spoerer and Streb (2013), ch. 6.

earliest cabinet meetings, Hitler himself stated that *"[t]he next five years must be devoted to the rearmament of the German people. Every public plan for the creation of jobs has to be judged from the point of view of whether it is necessary for the rearmament of the German people"*.[13] This was achieved by placing credit creation at the Reich's disposal. In the Nazi state, unemployment and rearmament went hand in hand.

3 Contribution to the Literature

This paper thus contributes to two strands of existing research.

The first is the study of fiscal multipliers using military spending as an exogenous government spending shock to estimate effects on GDP or unemployment. The empirical strategy I use is inspired by previous work from Nakamura and Steinsson (2014), who analyze data on US military procurement contracts to estimate regional multiplier effects of government spending. Their identifying assumption is that the United States did not embark on military buildups as an endogenous reaction to relative economic conditions between US states. I argue that the same assumption can be made about rearmament in Nazi Germany, and that the regional defense expenditure exposure variable I propose allows me to identify the effect of military spending on unemployment. This is particularly valuable given that the period of interest in the case of Nazi Germany spans only a few years, making it difficult to construct longer-term time series with multiple episodes of military buildups and drawdowns.

In a similar vein to Nakamura and Steinsson (2014), Auerbach, Gorodnichenko, and Murphy (2019) estimate local spillover effects of defense spending in US cities, and find positive effects on GDP and labor incomes. For outside the US, Malizard (2013) finds that defense spending has a *negative* effect on employment in France, arguing that this was due to a diversion of resources into less productive sectors. The effectiveness of government spending in stimulating the economy thus depends on a variety of factors and economic conditions, as pointed out by Ilzetzki, Mendoza, and Végh (2013).

Previous research has also examined military spending through the lens of air force production. For the United States, Ilzetzki (2024) finds that capacity constraints led to productivity gains in aircraft manufacturing through what he calls "learning by necessity". Similarly, Budraß, Scherner, and Streb (2005) analyze production patterns of the Luftwaffe before and during World War II.

[13] *Ministerialbesprechung vom 8. Februar 1933*, cited in Barkai (1990), p. 160.

For Nazi Germany, Erbe (1958) has previously estimated a fiscal multiplier of government spending of 1.6. He argues that this effect was far below what could have been observed had the Nazis aimed at stimulating the economy in a Keynesian sense – but by restricting income and consumption growth, the multiplier effect was muted as resources were channeled into rearmament (Erbe 1958). His reasoning was later corroborated by Ritschl (2002). On the other hand, Abelshauser (1999) suggests that Nazi deficit spending and Keynesian expansionary fiscal policy were what paved the way for Germany's recovery, which he claims was faster than what had been observed in other European countries, providing the economic foundation for Nazi Germany's rapid rearmament (Abelshauser 1999). This leads to the second strand of literature to which this paper contributes, which is how effective Nazi rearmament – and macroeconomic policy in general – was in lifting the German economy out of depression after 1933.[14].

A full discussion of this question is beyond the scope of this paper, yet it is important to note that the causal effect of Nazi economic policy in reducing unemployment is far from settled in academic debates.[15]

In response to Abelshauser (1999), Buchheim (2001) and Buchheim (2008) instead argues that German economic recovery had started as early as 1932, before Hitler's rise to power, and that many work creation policies and programs that had contributed to the decrease in unemployment in 1933 had already been implemented under the previous von Papen and Schleicher governments. According to Buchheim (2008), the recovery was primarily driven by a rebound in private investment, while public programs had a more limited impact, as they were largely financed through tax revenues – which depressed private demand – and, at best, served to stabilize existing employment rather than generate new jobs. Ritschl (2002) similarly suggests that recovery dynamics until 1936 were no different than what had been observed in Britain or the United States, and that the German upswing was more driven by a rebound effect than the Nazi's macroeconomic policies.

More recent research has since suggested a more active role of rearmament in stimulating employment. Fremdling and Stäglin (2015) find that the arms industry had created or induced more than five million jobs by 1935–1936, a number which increased to at least nine million shortly before the start of the war. Responding to Ritschl (2002), Fremdling

[14]Robinson (1972) famously said *"Hitler had already found how to cure unemployment before Keynes had finished explaining why it occurred."*

[15]See Barkai (1990), Buchheim (2008), Spoerer (2005), Spoerer and Streb (2013) for more detailed discussions.

and Stäglin (2015) claim that work creation and rearmament were at least "a sufficient condition" (Fremdling and Stäglin 2015, p. 22) for reaching full employment. This paper lends support to this view, arguing that military expansion presented a significant accelerating force, which likely bolstered the Nazi regime in the eyes of the population by improving labor market conditions. There is little doubt that the Nazis knew well how to exploit the rapid decrease in unemployment for propaganda purposes. Voigtländer and Voth (2014) find that *Autobahn* construction significantly increased political support for the regime, showing that voting patterns were significantly more favorable to the Nazi party in districts exposed to road construction projects. Ettmeier, Kriwoluzky, Papadia, et al. (2024) investigate the effectiveness of Nazi fiscal policy through the lens of an expectations creation channel. Albers (1976) and Abelshauser (1999) argue that the overall economic upswing made the general public less sensitive to the slow growth of consumption and real wages, which the Nazi state absorbed to finance military spending.

4 Data

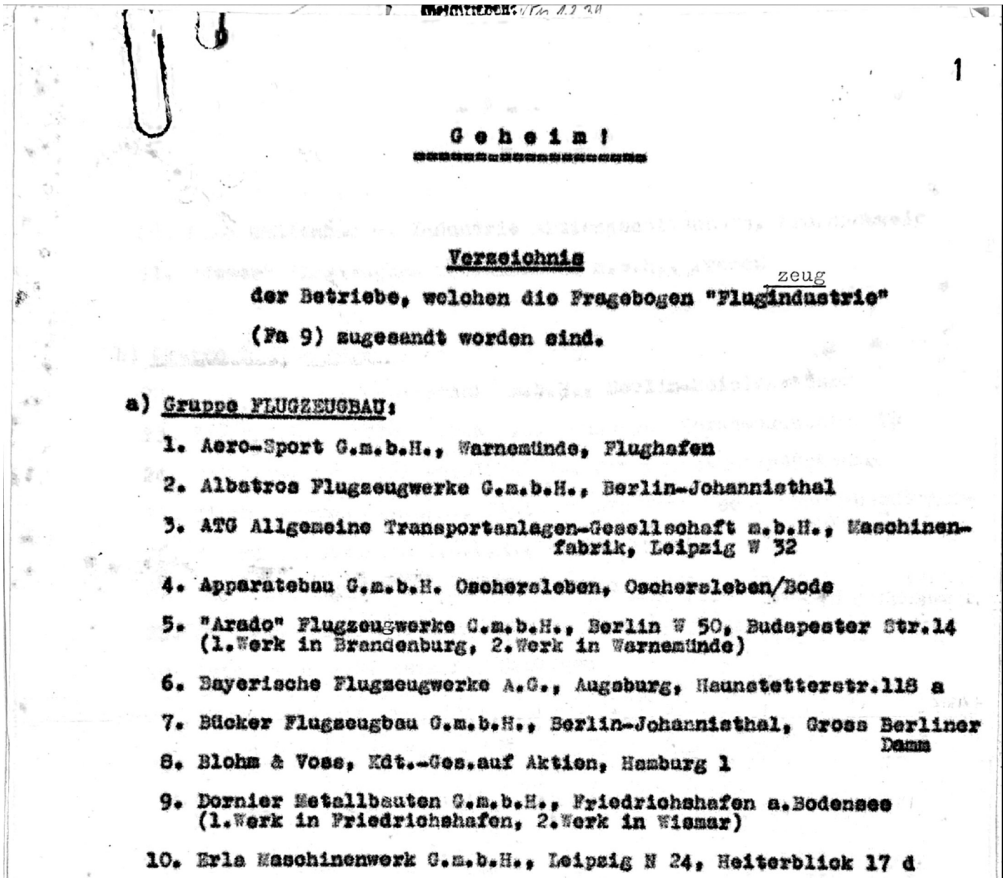
4.1 *Luftwaffe* Suppliers

The objective of this paper is to identify regional effects of rearmament on unemployment. Military expenditure data for Nazi Germany is notoriously difficult to reconstruct, as much of it was likely deliberately destroyed by the regime before the end of the war in 1945. Detailed arms production data is available only starting around 1938 (Wagenführ 1954, Tooze 2006), which is outside the period of interest of this paper. Moreover, these sources capture military output on an aggregate level, and do not allow for a regional analysis.

To construct my regional measure of exposure to the arms industry, I rely on an archival file of the StRA.[16] In 1933 and 1938, the StRA sent surveys to firms that produced goods relevant to aircraft manufacturing, which contained questions on employment, production capacities, and raw material consumption. The file I analyze in this paper contains the list of – presumably – all suppliers these questions were sent to in both of those years, including the addresses. Importantly, this covers *plant locations*, as some firms have multiple entries in different cities. In my analysis, I consider all individual

[16] BA R3102/3666. *Statistisches Reichsamt. Reichsergebnisse der Produktionserhebungen. Band 2, Flugzeugindustrie.*

plants. This yields a geographical distribution of plants for 1933 and 1938.[17] In total, *R3102/3666* records 121 individual entries, the first 10 of which are shown in Figure 6:



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 6: First Page of R3102/3666

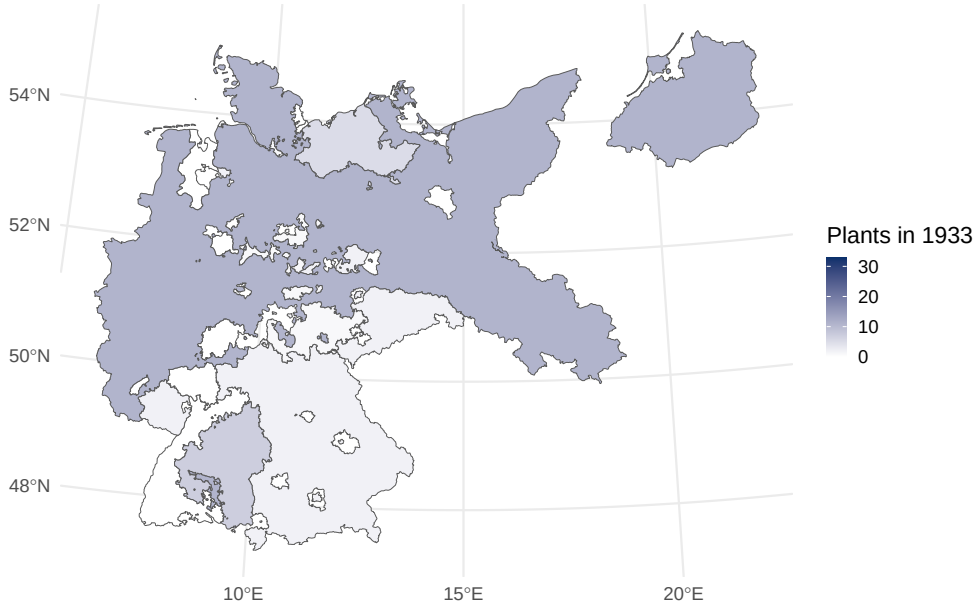
It could be of great interest to gather firm-level data for a richer analysis, but the returned questionnaires, if they still exist, are not in the StRA files. Thus, I do not have data on firm-level employment patterns or hours worked at the time of writing, and focus only on the location of each plant.

Additionally, for the firms recorded in 1938 but not 1933, these files do not allow me to determine when exactly these firms were founded or when they started arms-related production. Even though the period of interest is only until 1936, I argue that it is reasonable to assume that most Luftwaffe suppliers will have been founded or started adapting pro-

[17] Entries which are likely administrative headquarters are not considered. Plants in annexed Austria are also excluded.

duction before 1938.[18] Therefore, I use both distributions when constructing my regional exposure variable in my empirical analysis.

The list includes companies that remain well-known names today, such as *Daimler-Benz*, *BMW*, or *Junkers*. Figure 7 shows the density of plants for both years, aggregated to the *Länder*-level for visual clarity.[19] In total, 30 plants are recorded in 1933, and 88 in 1938. Notable Länder are Prussia, Württemberg, Bavaria, and Anhalt.

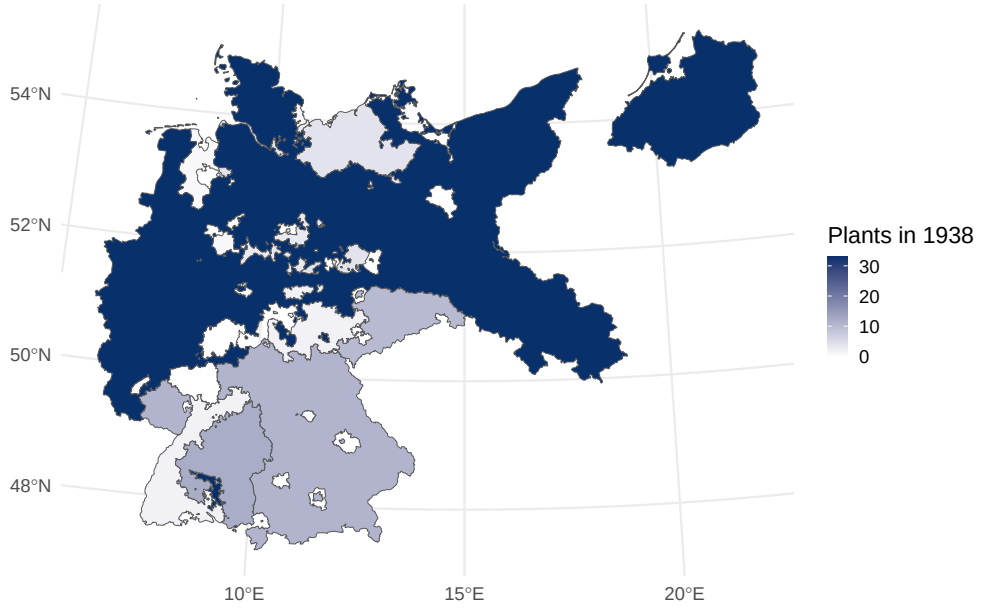


(a) 1933

Figure 7: Distribution of Luftwaffe Suppliers

[18] According to data in Streb (2023), p. 178, warplane production in 1936 relative to the start of World War II in September 1939 was 60%.

[19] 1936 Borders. Map according to MPIDR (Max Planck Institute for Demographic Research) and CGG (Chair for Geodesy and Geoinformatics, University of Rostock) (2011). For a more detailed map, see Appendix B.1.



(b) 1938

Figure 7: Distribution of Luftwaffe Suppliers (continued)

One limitation of these data is that many of these firms, especially carmakers, did not restrict their production to military goods. Hence, part of the observed economic activity may stem from civilian rather than military demand. While this is possible, I believe this to be a limited cause for concern. First, civilian demand in the Nazi economy was deliberately suppressed, and the fact that these firms were already recorded as early as 1933 suggests that they were at least preparing to engage in military production in the near future – likely outweighing any effects related to non-military output. Second, military-related data is inherently difficult to isolate, as military production cannot be neatly confined to a single industry, particularly when firms simultaneously produced both civilian and military goods (Streb 2023). In my data, firms are categorized into different groups according to what they produce, such as *aircraft engines* or *airframes*, which are unlikely to be of civilian use.[20]By focusing on a select group of firms with a clearly identifiable mili-

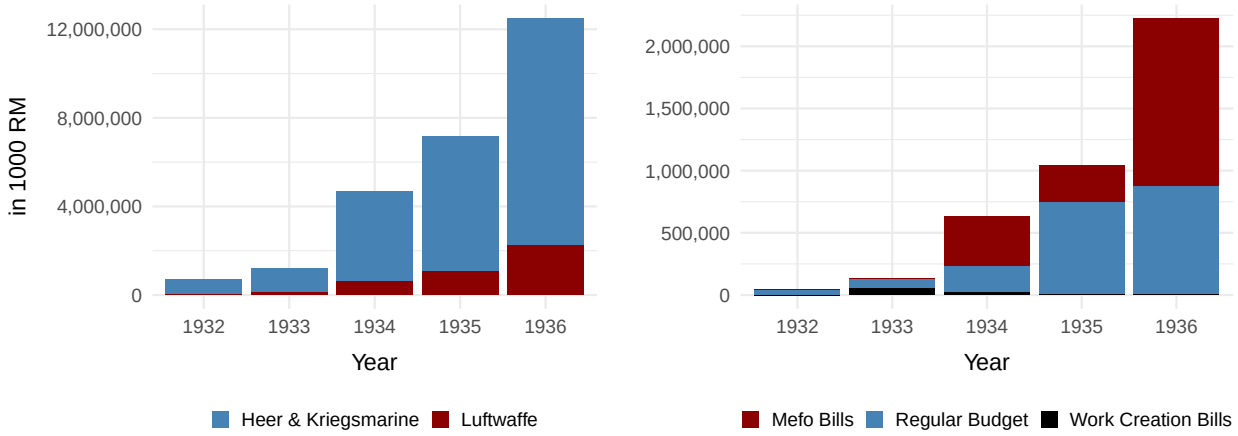
[20]This could also imply that recorded plants were those that produced military equipment exclusively, if

tary purpose, this approach offers an advantage over relying on aggregated arms data or indices commonly used in the existing historical literature.

4.2 Military Expenditure

The second step in constructing my exposure variable is combining the geographical variation of suppliers with aggregate expenditure variations across years. I use Luftwaffe budget figures from Oshima (1991), which include both official government accounts and broader estimates that incorporate shadow budgets resulting from *Wechsel* circulation. I hereafter refer to these as the *official* and *estimated* budgets, respectively.[21]

Figure 8 shows the share of the Luftwaffe in estimated military expenditure as a whole (panel *a*), next to a decomposition of the Luftwaffe budget into its official and unofficial sources (panel *b*).



(a) Luftwaffe Share, incl. Shadow Budgets

(b) Luftwaffe Budget Sources

Figure 8: Luftwaffe Expenditure, 1932–1936 (Oshima 1991)

Between 1932 and 1936, Luftwaffe expenditure increased from 43 million RM to about 2 *billion* RM in 1936, which represents an almost 50-fold increase. Nevertheless, this was only a small share relative to the amounts spent on the army, the *Reichsheer*, and the navy,

civilian goods were produced at separate locations and thus not concerned by this survey. However, my data do not allow me to verify this.

[21] Oshima (1991) provides a discussion of different sources used to construct military expenditure figures, which he argues were underestimated in the previous historical literature. I chose to use these estimates as they have been corroborated by later research (for instance Fremdling and Stäglin 2015) and provide clear archival documentation. For military expenditure: *Tabelle 10, Militärausgaben.*

the *Kriegsmarine* (Oshima 1991). Figure 8 also shows how important Mefo-bills were in turbocharging rearmament in the early 1930s, with about 60% of Luftwaffe spending being financed through these bills.[22] Therefore, I build my Luftwaffe exposure variable using both official and estimated expenditure figures for comparison, as the official statistics, by design, vastly underreport the true level.

4.3 District-level Unemployment

Data on unemployment has kindly been provided by Ettmeier, Kriwoluzky, Papadia, et al. (2024), who collect unemployment data on the *employment district*-level, or *Arbeitsamtbezirk*, from the Federal Archives in Berlin. These data were recorded by the Reich Labor Office and published in the *Reichsarbeitsblatt* from 1930 to 1936. Their data set covers unemployment statistics for 358 of such districts, as well as district-level population, which allows for the calculation of district-level unemployment per capita.

Ettmeier, Kriwoluzky, Papadia, et al. (2024) record unemployment using three distinct categories: (1) individuals registered with unemployment insurance, (2) recipients of government crisis support transfers introduced during the Great Depression, and (3) recipients of general government welfare payments. Figure 9 illustrates the annual evolution of unemployed persons aggregated from employment districts (in bars) against the total unemployment estimate from the Statistical Yearbook (StJB):[23]. In this paper, I follow Ettmeier, Kriwoluzky, Papadia, et al. (2024) and focus on unemployment insurance and crisis relief. I then manually map each plant from the list of Luftwaffe suppliers to each district. In 1933, 30 plants were distributed across 18 out of 358 districts. In 1938, 88 plants were located in 42 individual districts.

[22] Appendix B.3 shows Figure 8 for 1932–1939.

[23] Both of these metrics likely underestimate the true level of unemployment, see Spoerer and Streb (2013) ch. 6 for a discussion.

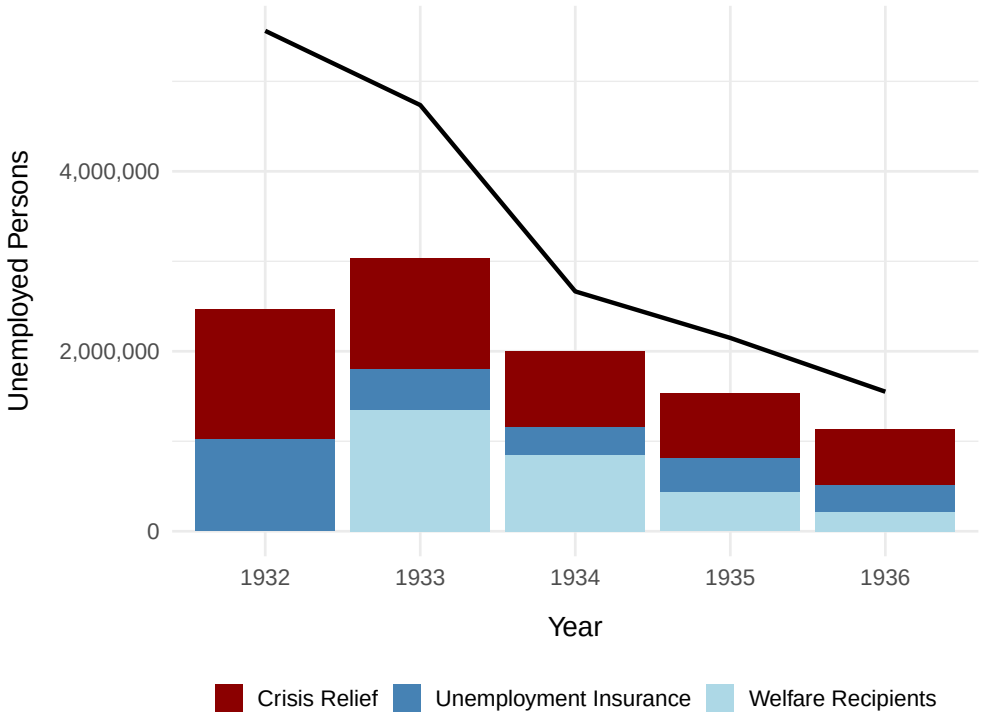


Figure 9: Unemployed Persons According to Ettmeier, Kriwoluzky, Papadia, et al. (2024) and StJB

5 Empirical Analysis

5.1 Computing *Luftwaffe* Exposure

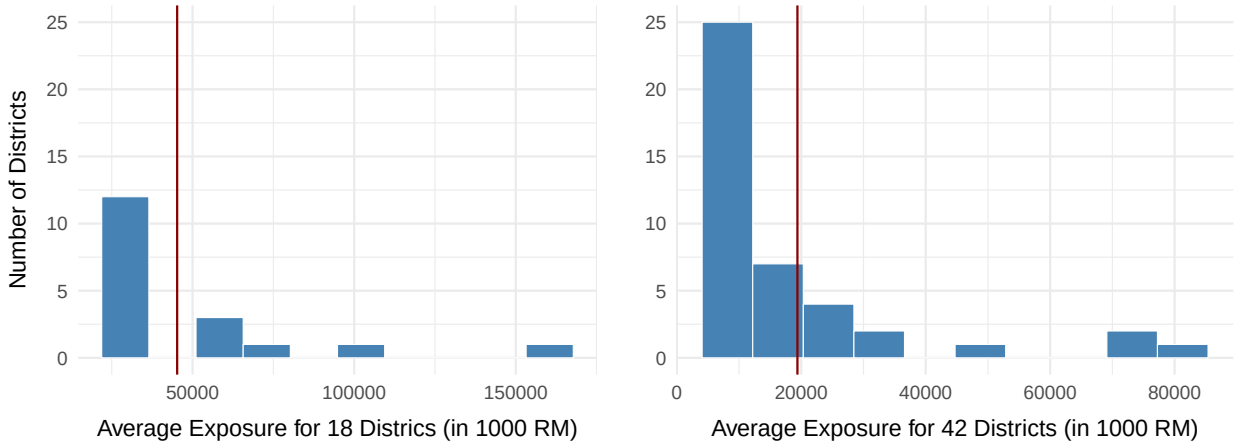
To map military spending to each district, I propose the following measure of *"Luftwaffe exposure"* for district d at time t, which I call LW_{dt}:

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

I compute district-level exposure by weighting the total Luftwaffe budget $LW_{Reich,t}$, which varies across years t, according to the number of plants in each district as a share of all plants in the Reich, which varies across district d. This supposes that the total Luftwaffe budget is distributed evenly across firms. In total, this approach yields four exposure estimates, as I compute LW_{dt} using plant locations from both 1933 and 1938,

combined with either the official or the estimated (i.e., including shadow budgets) aggregate Luftwaffe expenditure.

Figure 10 plots average Luftwaffe exposure in 1000 RM from 1933 to 1936 across all non-zero districts.[24]. The mean across all districts is given by the red line. Districts with plants recorded in 1933 experienced an average annual exposure of about 45.2 million RM, with most plants being located in Berlin, Stuttgart, Rostock, and Dessau. For plants recorded in 1938, the average exposure per year is about 19.3 million RM, and the most exposed districts are Berlin, Brandenburg, Leipzig, and München.



(a) Plants 1933

(b) Plants 1938

Figure 10: Luftwaffe Exposure by Districts, Average 1933–1936

This district-level exposure measure is next combined with unemployment and population data from Ettmeier, Kriwoluzky, Papadia, et al. (2024).

Figure 11 shows employment districts scattered according to unemployment and log Luftwaffe exposure for each year in the sample, both in per capita terms. Here, Luftwaffe exposure is computed using the 1933 firm distribution and estimated budget numbers[25]. Unemployment is constructed as the sum of persons in unemployment insurance and crisis relief. It shows an initially positive relationship that gradually reverts to a negative one by 1935.

[24] I use the estimated Luftwaffe budget for illustration here. When considering the official expenditure numbers, the means drop to about 21.5 and nine million, respectively.

[25] Using the 1938 firm distribution yields a very similar plots to the one shown here, which is why they are omitted for brevity. See Appendix B.4.

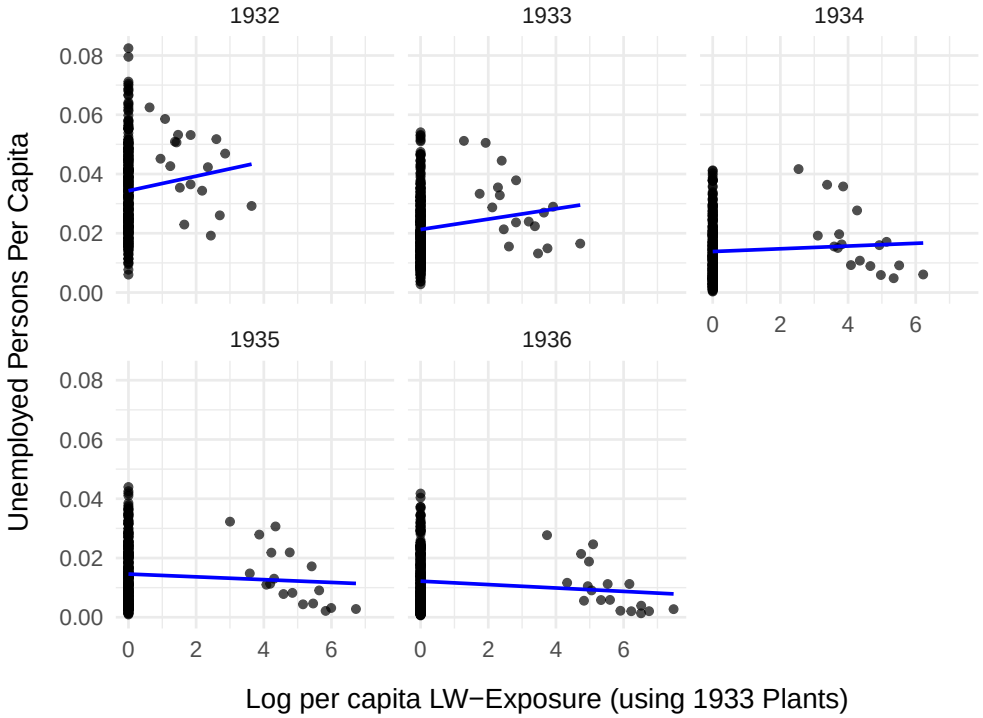


Figure 11: Per capita Unemployment and log Luftwaffe Exposure

It follows that unemployment took about two years to respond to the Luftwaffe rearmament shock. Therefore, my main analysis will estimate the effect of Luftwaffe exposure on unemployment *relative* to 1932 as a base year to allow for a cumulative effect over time. Appendix B.4 presents the same plot as in Figure 11, but with unemployed persons per capita relative to 1932 on the y-axis, revealing a persistent negative relationship. Additionally, it could be that districts with a high level of initial exposure, such as Berlin or Stuttgart, were more traditionally more industrious and thus more affected by mass unemployment between 1929 and 1932, which could explain the initial positive relationship visible for 1932 and 1933. This will be discussed further in Subsection 5.4.

5.2 Empirical Strategy

To estimate the effect of Luftwaffe exposure on unemployment, I make the following identifying assumption, which has previously been made by Nakamura and Steinsson (2014) in the context of military spending in US states. I assume that Nazi Germany did not undertake its military buildup in response to relative economic conditions between German regions. Therefore, regional – or, in my case district-level – variations in Luft-

waffe exposure allow me to identify the causal effect of military spending on unemployment.

I then estimate the following equation:

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

where

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

α_d and γ_t represent district and year fixed effects, respectively. Exposure is expressed in 1000 RM and divided by district-level population. ϵ_{dt} is an error term.

I estimate the equation using weighted least squares (WLS), with 1932 population levels serving as observation weights. By estimating the change in unemployed persons per capita relative to 1932, I allow for a cumulative effect of military spending over time.[26] I also assume the absence of cross-district spillover effects. This simplification is reasonable given that many heavily exposed districts—such as Berlin, Stuttgart, and Rostock—were already large, self-contained urban centers in the 1930s, reducing the likelihood of substantial cross-district commuting. By keeping population constant to 1932 levels in the denominator on the right-hand side, I control for potential population changes that might be driven by Luftwaffe exposure.

5.3 Main Findings

Table 1 reports estimates for β from Equation 1 using the three different unemployment metrics from Ettmeier, Kriwoluzky, Papadia, et al. (2024). *Panel A* uses the exposure variable constructed from the plant distribution in 1933, while *Panel B* does so using the plant locations in 1938. The first three columns use official Luftwaffe expenditure for the total Reich Luftwaffe budget, while columns 4–6 include estimated shadow budgets. Standard errors are clustered at the district level, to allow for correlation within districts over time. All regressions include district and year fixed effects.

[26] I also estimated Equation 1 using first and second differences. However, the year-on-year variations in unemployment are strongest in 1933–1934, which is when year-on-year variations in Luftwaffe spending are lowest, which leads to unreliable estimates. See Appendix D.

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

I find statistically significant effects of Luftwaffe exposure on unemployment when using plant locations from 1933 at the 10%-level. When repeating the estimation using the plant distribution of 1938, estimated effects are slightly larger and statistically significant at the 5% and 1%-levels. Naturally, the effect is considerably larger when using official Luftwaffe statistics compared to those including shadow budgets, which highlights how official government accounts from the Nazi era understate the true military spending that occurred during this period. Therefore, the remainder of this section will focus on results obtained from using estimated total Luftwaffe spending.

The fact that estimates are larger and more significant when considering plant locations in 1938 is reassuring, as more plants were recorded in 1938 and spread across more districts. It could be that location choices made by firms in 1933 were driven by pre-existing industrial trends, agglomeration patterns or urban characteristics, which would make the location decision endogenous. If these were persistent considerations, estimates

should be similar for both distributions. Thus, the fact that the 1938 plants yield stronger effects supports the use of my instrument to identify the effect on unemployment.

The coefficient on my unemployment variable, $Ins. + Crisis$, which combines unemployment insurance and crisis support recipients, ranges from -0.02 to -0.03 (column 6). This implies that a 1,000 RM per capita increase in Luftwaffe expenditure is associated with a 2–3 percentage point decline in unemployment – or, equivalently, a reduction of 20–30 unemployed persons per 1,000 inhabitants – relative to unexposed districts. The evidence points to a substantial effect of rearmament in reducing unemployment, even during the early years of Nazi rule, lending support to the results by Fremdling and Stäglin (2015). Considering that the unemployment metric used is most likely downward biased (see Figure 9, Spoerer and Streb (2013)), my estimates should be considered as lower bounds.

For illustrative purposes, I extrapolate the estimated effect of Luftwaffe exposure to broader categories of government spending. Specifically, I calculate the predicted change in unemployment per capita using total military expenditure and total government expenditure per capita over the period 1932–1936. This is motivated by the fact that per capita Luftwaffe spending alone never approached 1,000 RM; therefore, I consider these broader aggregates as proxies for fiscal stimulus at scale. Thus, I approximate :

$$\text{Average Effect} \approx \beta \cdot \frac{\sum_{d,t=1932}^{1936} \text{Exposure}_{dt}}{\sum_{d} \text{Pop}_{d,1932}}$$

where β is either β_{1933}, that is, estimated using the 1933 plant distribution, or β_{1938}, equivalently obtained using the 1938 distribution.

The results are reported in Table 2. Column 1 displays spending per capita in Reichsmark. Column 2 shows the predicted response of unemployed persons per capita using β_{1933}, and column 3 shows the results from using β_{1938}.

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).

For comparison, from the German Statistical Yearbook, I compute a peak unemployed persons per capita rate of 9.4% in February 1932.[27] The results in Table 2 imply that Nazi government spending could explain up to 34% of the decrease in unemployment between 1932 and 1936, 10% of which would be due to military spending.[28]

Additionally, to investigate how the effect of Luftwaffe exposure varies over time, I estimate Equation 1 separately for each year. Equation 1 then becomes:

$$\Delta U_{dt} = \beta \frac{\text{Exposure}_{dt}}{\text{Pop}_{d,1932}} + \epsilon_{dt}, \quad \text{for } t \in \{1933, 1934, 1935, 1936\} \tag{2}$$

The results are shown below in Figure 12. The full set of regression tables is shown in Appendix C. From estimating Equation 1 separately for each year, I find that the strongest effect occurs in 1935[29], with an estimated reduction in unemployment of approximately 4 to 5 percentage points. The distribution of plants in 1938 consistently yields coefficients that are more statistically significant. This reinforces the results presented in Table 1 and strengthens the credibility of my identification strategy by suggesting that plant locations were not endogenous to geographic or economic conditions prior to 1933. Overall, this supports the hypothesis that rearmament had an effect on the German labor market as early as 1934.

This analysis could be refined by using an alternative estimator from the recent difference-in-differences literature (see de Chaisemartin and d'Haultfoeuille 2023), specifically in the context of heterogeneous adoption designs (HAD). As the effect of Luftwaffe exposure varies over time in this setting, further empirical analysis is needed to ensure that my original WLS estimate for β can correctly identify a causal effect. While such an extension lies beyond the scope of this paper, it is nevertheless reassuring that the main findings are corroborated by the cross-sectional analysis presented in Figure 12.

[27] *Statistisches Jahrbuch*, 1934, pp. 5 and 292.

[28] Approximated as $\frac{\beta}{9.4} \times 100$.

[29] Disregarding the first point estimate for the 1938 distribution, as it reflects a hypothetical effect had the 1938 plants been operational in 1933.

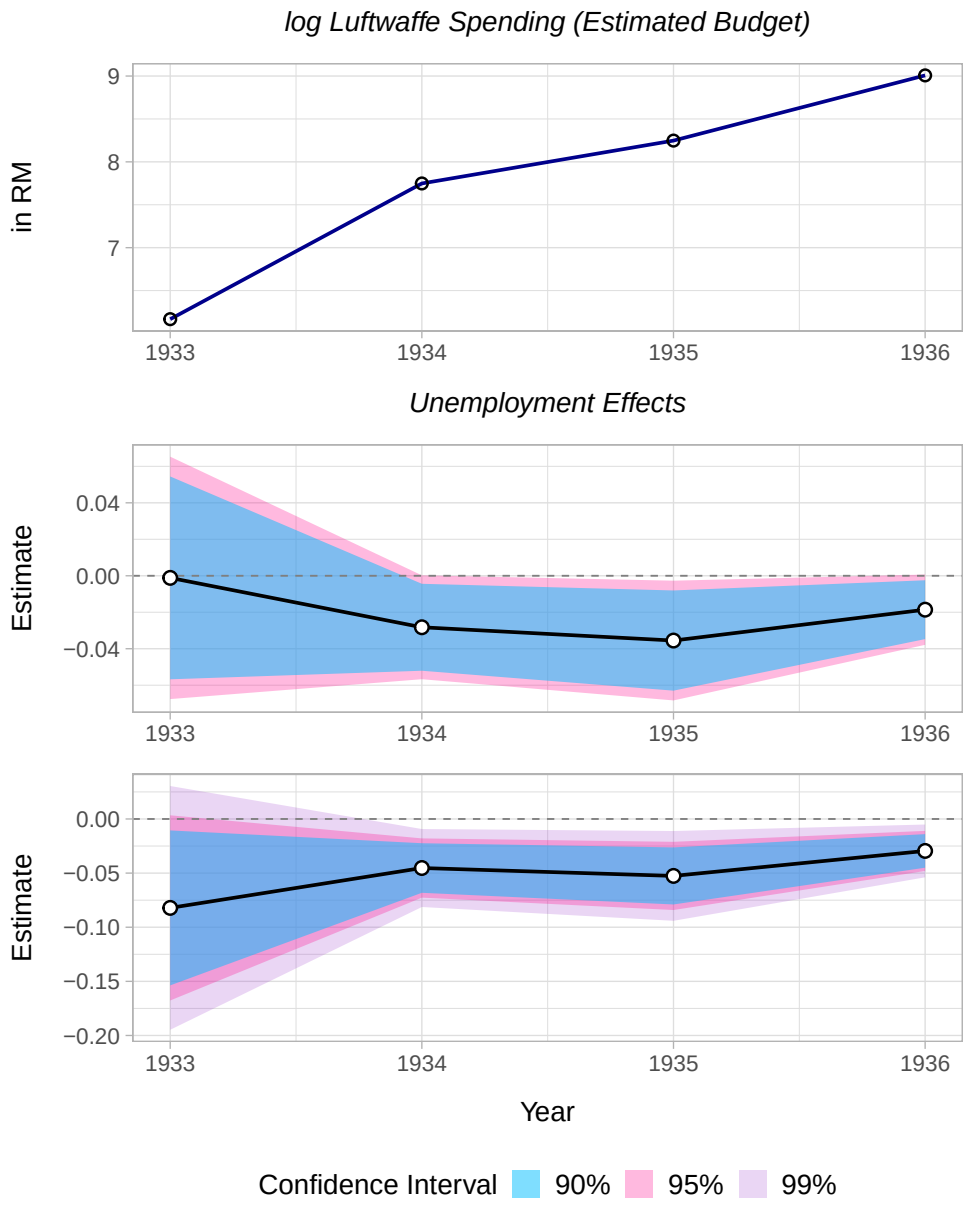


Figure 12: Estimates of Equation 1 by Year

Note: The middle plot shows estimates based on the 1933 distribution; the lower plot uses the 1938 distribution.

5.4 Robustness

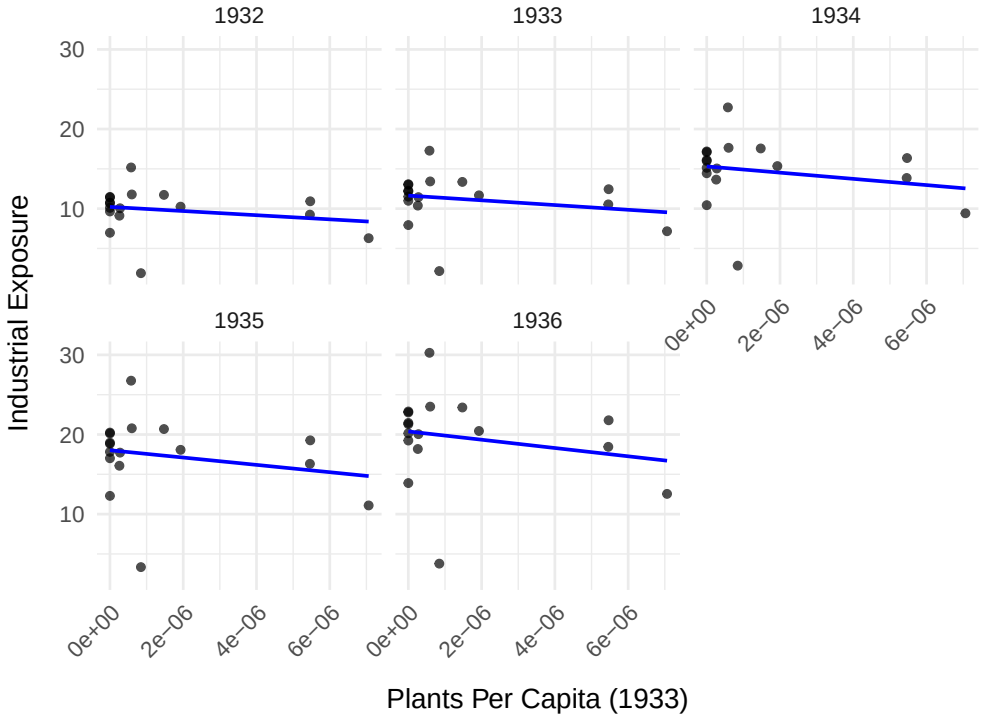
To assess the robustness of these results, I examine whether firms' location choices may have been influenced by pre-existing regional characteristics, such as historical industrial structures or patterns of agglomeration. If the areas where plants were established were already more industrialized or productive prior to rearmament, the estimated effects could conflate the impact of military spending with a localized industrial rebound that would have occurred as part of the broader national recovery. If plant location was an endogenous choice, the estimates would not isolate the causal effect of defense expenditure.

Therefore, I repeat elements of the previous analysis on the *Länder*-level. Länder-level data is much less detailed than district-level data, which makes it unsuitable for estimating military spending effects as before. However, I believe it is plausible that any underlying endogeneity due to historical trends should be detectable beyond the district level, as those likely caused spillover effect over time. Moreover, to construct a measure of industrial exposure that is analogous to LW_{dt}, I combine data on industrial unemployment from Hohls and Kaelble (1989), which is available on the Länder-level only, with annual industrial production indices from the League of Nations (1939).[30] Hohls and Kaelble (1989) rely on employment census data which has not been collected consistent regular intervals. Thus, I can only use data from 1933. This allows me to compute:

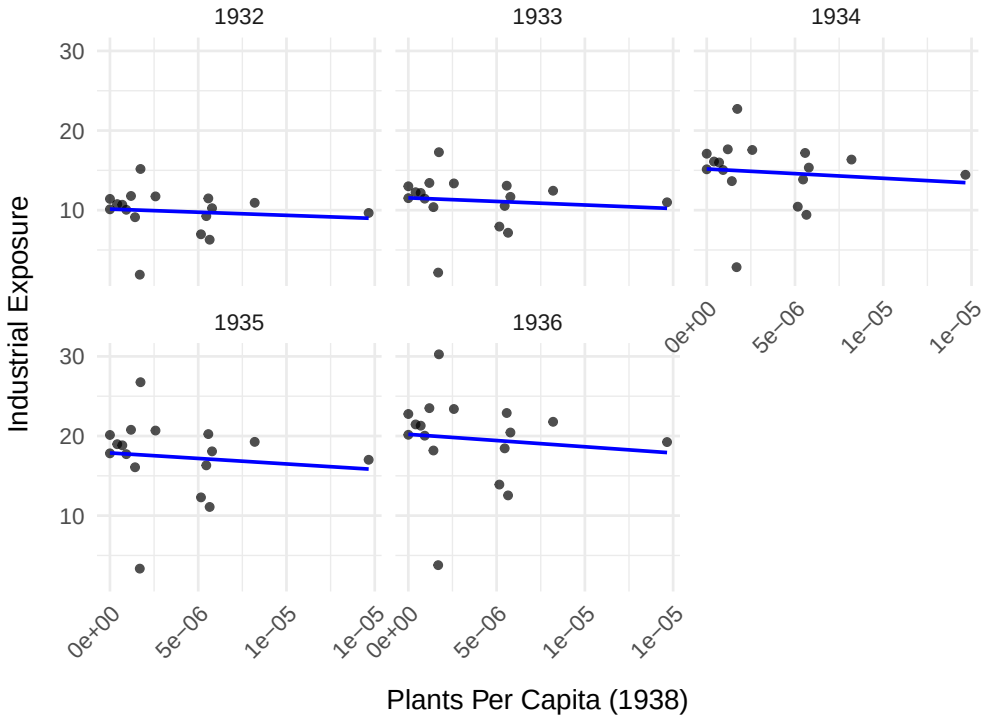
$$\text{Ind. Exposure}_{lt} = \text{Production Index}_{Reich,t} \times \frac{\text{Ind. Employment}_{l,1933}}{\text{Pop}_{l,1933}}$$

Figure 13 shows the correlation between industrial exposure and plants per capita for each Land. By holding the number of firms per capita constant on the x-axis, the figure isolates how changes in industrial exposure over time relate to the location of defense firms, allowing the linear relationship to be driven solely by movements in exposure. Perhaps surprisingly, the two are very weakly and *negatively* correlated, irrespective of the plant distribution considered. Importantly, the relationship seems stable cross years. Reassuringly, this provides further support for my identification strategy, as the plant locations in my data do not appear to be endogenous to industrial characteristics unrelated to rearmament.

[30] Table 109, *Index Numbers of Industrial Production. General Index*, p. 181.



(a) Plants 1933



(b) Plants 1938

Figure 13: Correlation of Industrial Exposure and Plants per capita

Appendix E provides detailed estimates for Equation 1 on the Länder-level and demonstrates that my findings are robust to the inclusion of $Ind.Exposure_{lt}$ as a control variable in Equation 1. Moreover, the results suggest that the impact of rearmament on employment becomes statistically insignificant after 1936, which is around when full employment was reached. This is an intuitive result, as unemployment could no longer respond to substantial increases in military spending, which reinforces the validity of restricting the analysis to the 1932–1936 period.

6 Concluding Remarks

This paper provides new empirical evidence on the effects of rearmament on unemployment in Nazi Germany. Using a newly assembled archival dataset that pinpoints the geographic distribution of firms supplying the German *Luftwaffe*, I build a regional measure of exposure to military expenditure. I show that districts hosting Luftwaffe-related production experienced a statistically significant decline in unemployment of up to 3 percentage points relative to districts that do not. When estimating the effect for each year separately, the effect increases to up to 5 five percentage points. Important data limitations imply that estimates should be treated as lower bounds, as the statistics used likely understate the true level of unemployment. My results suggest an active role of Nazi economic policy in contributing to the German upswing of the early 1930s, at least in the short run. These findings are robust to the inclusion of controls for pre-existing industrial structures, lending support to the use of my exposure variable to identify a causal effect of military spending. Extrapolating from the estimated local treatment effects, I find that government spending can account for up to 34% of the decline in unemployment between 1932 and 1936, of which 10% are due to military spending alone. This likely reinforced popular support for the regime and facilitated its transition to a war economy.

Further research could build on this analysis by examining individual suppliers to investigate the firm-level effects of the Nazi rearmament shock. This could be done by gathering plant-level archival data on hours worked or production patterns. Moreover, the Nazi system of closed credit cycles and shadow budgets remains vastly understudied in the existing literature. Future research could therefore shed light on how autocratic states maintain economic resilience in the context of military conflict — an area of growing relevance as the economic consequences of geopolitical tensions and war unfortunately demand renewed scholarly attention.

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Appendix

A Discussion of Data Sources and Archival Material

With the exception of district-level data, which has been provided by Ettmeier, Kriwoluzky, Papadia, et al. (2024) and for which I am incredibly grateful, all data used in this research project has been hand collected from primary and secondary sources. I have done so at the *Bundesarchiv Berlin-Lichterfelde*, the library of the *Deutsches Institut für Wirtschaftsforschung* (DIW Berlin) and the *Bibliothèque nationale de France* in Paris, where I was able to discover various primary and secondary sources at various stages when researching this paper. I am indebted to the staff at all three of those institutions for their helpful suggestions and support, particularly Diana Fuenmayor, Katja Buro and Katharinna Zschuppe.

A statistical source frequently cited in this project is the Statistical Yearbook of the German Empire (*Statistisches Jahrbuch für das Deutsche Reich*), which I accessed online using this link. At the DIW, I was able to look at the *Wochenberichte* and the *Konjunkturstatistische Handbücher*. I also consulted the editions of *Vierteljahreshefte zur Statistik des Deutschen Reichs*, the *Lageberichte der Deutschen Kreditgesellschaft AG* and *Wirtschaft und Statistik*, two recurring publications of the StRA, to construct time-series of additional outcome variables that I did not analyze further in this paper.

While in Berlin, my main focus were the archives of the Reichsbank, the StRA and the Reich Ministry of Finance. Archival files cited in this project are:

- **R 2501/1760.** *Berichte zur allgemeinen Konjunktur, Band 27.*
- **R 3102/2700.** *Wirtschaftsfinanzierung.*
- **R 3102/7132.** *Deutsche Kriegsfinanzierung und Wirtschaftspolitik.*
- **R 3102/2482.** *Arbeitsbeschaffung: Auswirkung und Finanzierung.*
- **R 3102/3666.** *Reichsergebnisse der Produktionserhebungen, Band 2: Flugzeugindustrie.*

In total, I consulted at least 80 files at the Bundesarchiv.

B Supplementary Figures

B.1 Detailed Maps

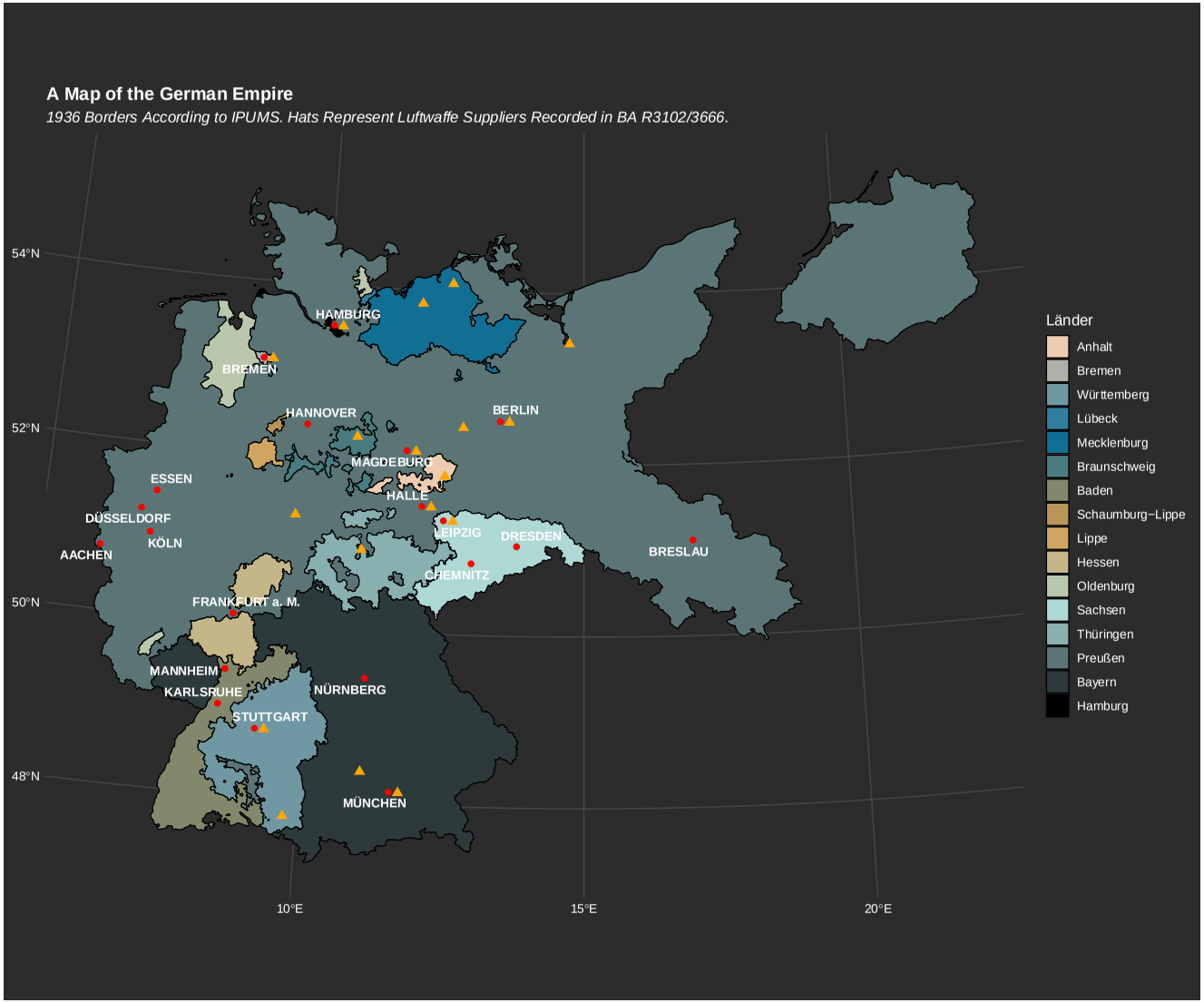


Figure A1: Detailed Map, 1933 Plant Locations

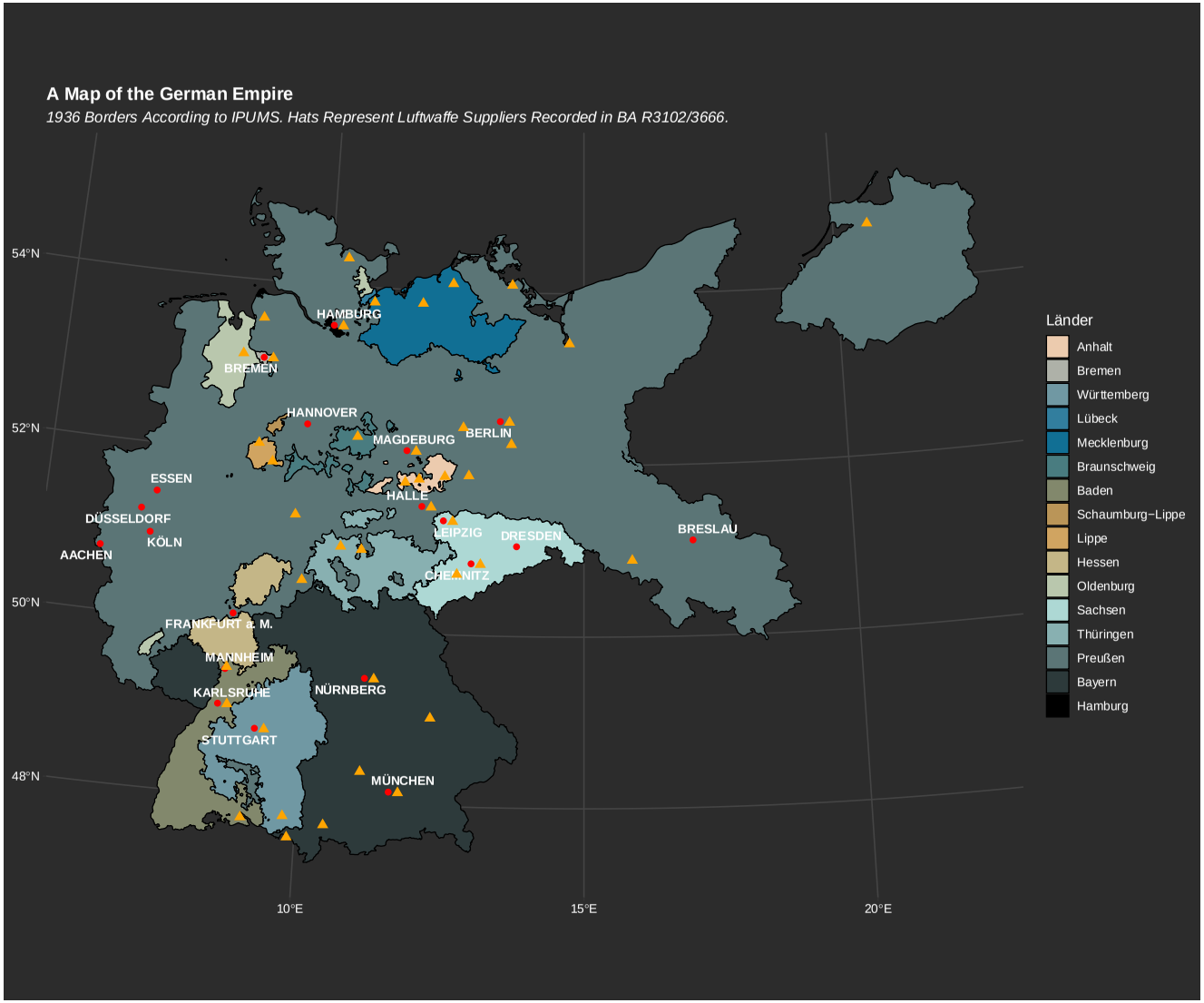


Figure A2: Detailed Map, 1938 Plant Locations

B.2 Total Military Spending

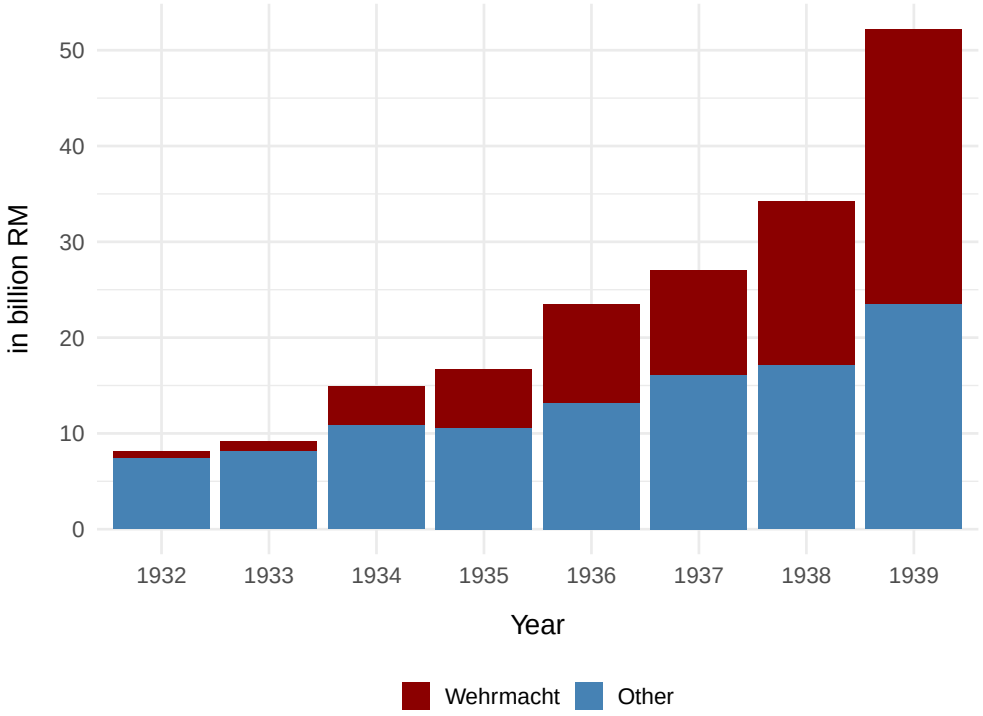
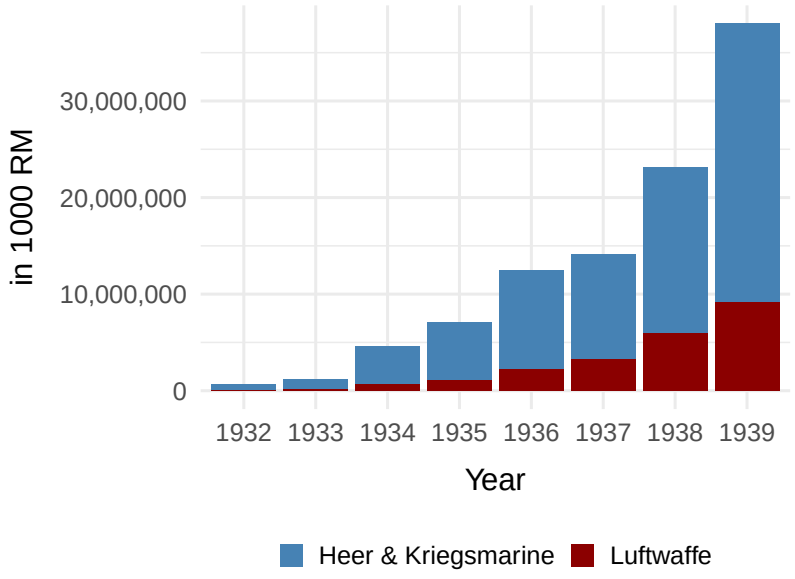
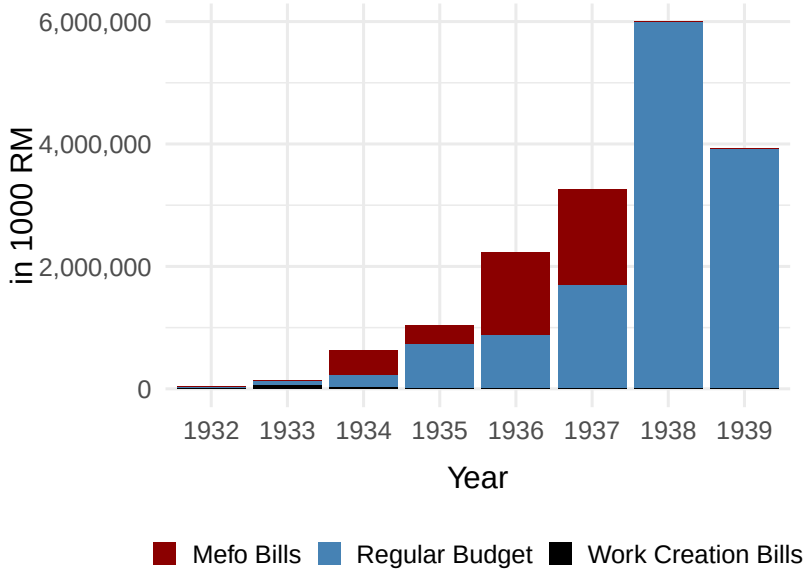


Figure A3: Military Expenditure as Share of Total Spending (continued)

B.3 Extended Luftwaffe Budget Decomposition



(a) Luftwaffe Share, incl. Shadow Budgets (cont'd)



(b) Luftwaffe Budget Sources (cont'd)

Figure A4: Luftwaffe Expenditure, 1932–1939 (Oshima 1991)

B.4 Correlation Plots

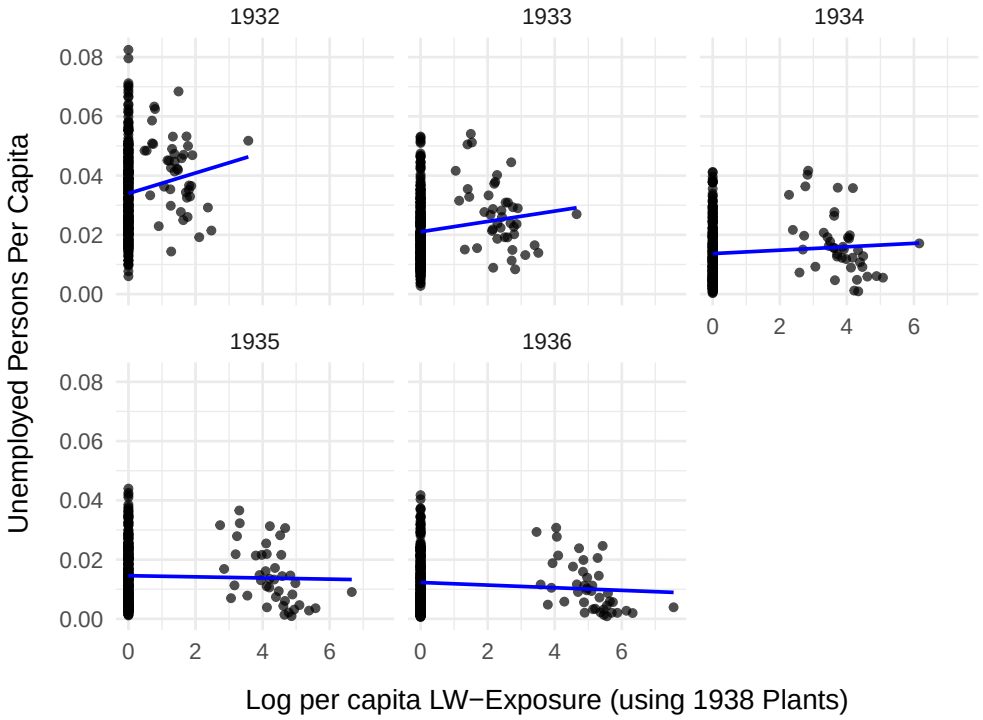
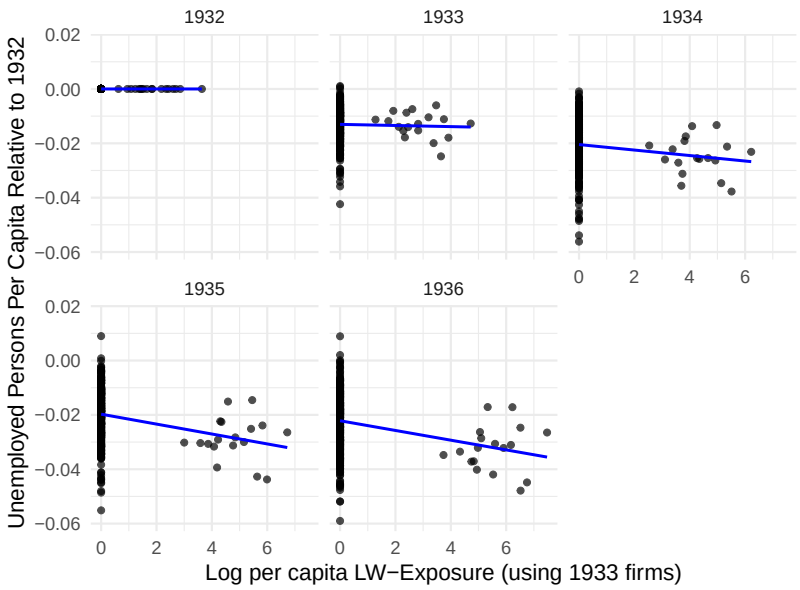
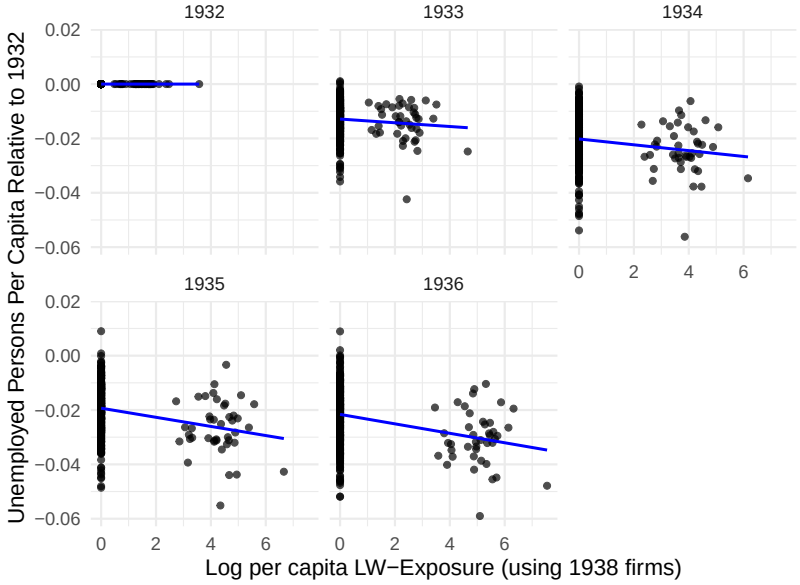


Figure A5: Per capita Unemployment and log Luftwaffe Exposure (continued)



(a) Plants 1933



(b) Plants 1938

Figure A6: Unemployment per capita Since 1932 and Luftwaffe Exposure

C Year-by-Year Regression Tables

Table 3: Unemployment and Luftwaffe Exposure: 1933-1934

	Official			Estimated[1]		
	Insured	Crisis	Ins. + Crisis	Insured	Crisis	Ins. + Crisis
1933						
(Intercept)	-0.0088***	-0.0034***	-0.0123***	-0.0088***	-0.0034***	-0.0123***
	(0.0002)	(0.0004)	(0.0004)	(0.0002)	(0.0004)	(0.0004)
Firms 1933	0.0031	-0.0051	-0.0020	0.0019	-0.0030	-0.0012
	(0.0275)	(0.0590)	(0.0573)	(0.0163)	(0.0350)	(0.0339)
Num. Obs.	352	352	352	352	352	352
R^2	0.000	0.000	0.000	0.000	0.000	0.000
Std. Errors	District	District	District	District	District	District
1934						
(Intercept)	-0.0111***	-0.0093***	-0.0204***	-0.0111***	-0.0093***	-0.0204***
	(0.0003)	(0.0004)	(0.0004)	(0.0003)	(0.0004)	(0.0004)
Firms 1933	-0.0315	-0.0543*	-0.0858*	-0.0104	-0.0179*	-0.0282*
	(0.0237)	(0.0287)	(0.0441)	(0.0078)	(0.0094)	(0.0145)
Num. Obs.	351	351	351	351	351	351
R^2	0.009	0.015	0.018	0.009	0.015	0.018
Std. Errors	District	District	District	District	District	District
Fixed Effects	X	X	X	X	X	X

[1]*This includes estimated shadow budgets resulting from* Wechsel-*circulation.*
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Unemployment and Luftwaffe Exposure: 1935-1936

	Official			Estimated[1]		
	Insured	Crisis	Ins. + Crisis	Insured	Crisis	Ins. + Crisis
1935						
(Intercept)	-0.0098***	-0.0111***	-0.0209***	-0.0098***	-0.0111***	-0.0209***
	(0.0004)	(0.0005)	(0.0008)	(0.0004)	(0.0005)	(0.0008)
Firms 1933	-0.0147*	-0.0352**	-0.0500**	-0.0105*	-0.0250**	-0.0355**
	(0.0081)	(0.0161)	(0.0236)	(0.0057)	(0.0115)	(0.0167)
Num. Obs.	350	350	350	350	350	350
R^2	0.024	0.058	0.054	0.024	0.058	0.054
Std. Errors	District	District	District	District	District	District
1936						
(Intercept)	-0.0113***	-0.0126***	-0.0238***	-0.0113***	-0.0126***	-0.0238***
	(0.0004)	(0.0007)	(0.0010)	(0.0004)	(0.0007)	(0.0010)
Firms 1933	-0.0115	-0.0358**	-0.0473*	-0.0045	-0.0141**	-0.0186*
	(0.0074)	(0.0179)	(0.0250)	(0.0029)	(0.0070)	(0.0098)
Num. Obs.	350	350	350	350	350	350
R^2	0.019	0.059	0.050	0.019	0.059	0.050
Std. Errors	District	District	District	District	District	District
Fixed Effects	X	X	X	X	X	X

[1]*This includes estimated shadow budgets resulting from* Wechsel-*circulation.*
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Unemployment and Luftwaffe Exposure: 1933-1934 (cont'd)

	Official			Estimated[1]		
	Insured	Crisis	Ins. + Crisis	Insured	Crisis	Ins. + Crisis
1933						
(Intercept)	-0.0088***	-0.0033***	-0.0121***	-0.0088***	-0.0033***	-0.0121***
	(0.0002)	(0.0005)	(0.0004)	(0.0002)	(0.0005)	(0.0004)
Firms 1938	-0.0326	-0.1062*	-0.1387*	-0.0193	-0.0629*	-0.0821*
	(0.0317)	(0.0632)	(0.0737)	(0.0188)	(0.0374)	(0.0436)
Num. Obs.	352	352	352	352	352	352
R^2	0.001	0.008	0.008	0.001	0.008	0.008
Std. Errors	District	District	District	District	District	District
1934						
(Intercept)	-0.0111***	-0.0092***	-0.0203***	-0.0111***	-0.0092***	-0.0203***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Firms 1938	-0.0401**	-0.0975***	-0.1376***	-0.0132**	-0.0321***	-0.0453***
	(0.0197)	(0.0313)	(0.0424)	(0.0065)	(0.0103)	(0.0140)
Num. Obs.	351	351	351	351	351	351
R^2	0.009	0.031	0.029	0.009	0.031	0.029
Std. Errors	District	District	District	District	District	District
Fixed Effects	X	X	X	X	X	X

[1] *This includes estimated shadow budgets resulting from* Wechsel-*circulation.*
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Unemployment and Luftwaffe Exposure: 1935-1936 (cont'd)

	Official			Estimated[1]		
	Insured	Crisis	Ins. + Crisis	Insured	Crisis	Ins. + Crisis
1935						
(Intercept)	-0.0098***	-0.0109***	-0.0206***	-0.0098***	-0.0109***	-0.0206***
	(0.0004)	(0.0005)	(0.0008)	(0.0004)	(0.0005)	(0.0008)
Firms 1938	-0.0200**	-0.0540***	-0.0740***	-0.0142**	-0.0384***	-0.0526***
	(0.0078)	(0.0158)	(0.0226)	(0.0055)	(0.0112)	(0.0161)
Num. Obs.	350	350	350	350	350	350
R^2	0.028	0.084	0.073	0.028	0.084	0.073
Std. Errors	District	District	District	District	District	District
1936						
(Intercept)	-0.0112***	-0.0123***	-0.0235***	-0.0112***	-0.0123***	-0.0235***
	(0.0004)	(0.0007)	(0.0010)	(0.0004)	(0.0007)	(0.0010)
Firms 1938	-0.0185***	-0.0566***	-0.0751***	-0.0073***	-0.0222***	-0.0295***
	(0.0071)	(0.0174)	(0.0241)	(0.0028)	(0.0068)	(0.0095)
Num. Obs.	350	350	350	350	350	350
R^2	0.029	0.091	0.078	0.029	0.091	0.078
Std. Errors	District	District	District	District	District	District
Fixed Effects	X	X	X	X	X	X

[1] *This includes estimated shadow budgets resulting from* Wechsel-*circulation.*
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

D First and Second Difference Regressions

Table 7: Unemployment (First Difference)

	Official				Estimated[1]			
	Insured	Crisis	Welfare	Ins. + Crisis	Insured	Crisis	Welfare	Ins. + Crisis
Panel A								
Exposure 1933	-0.0069**	-0.0240	0.0016	-0.0309*	0.0020	-0.0008	0.0212*	0.0012
	(0.0035)	(0.0175)	(0.0048)	(0.0170)	(0.0020)	(0.0050)	(0.0116)	(0.0048)
Num. Obs.	1402	1402	1049	1402	1402	1402	1049	1402
R^2	0.818	0.476	0.828	0.705	0.817	0.471	0.834	0.702
R^2 Within	0.002	0.010	0.000	0.010	0.001	0.000	0.037	0.000
Std. Errors	District	District	District	District	District	District	District	District
Panel B								
Exposure 1938	-0.0079	-0.0228	-0.0045	-0.0307	0.0023	0.0016	0.0271**	0.0039
	(0.0055)	(0.0163)	(0.0071)	(0.0196)	(0.0022)	(0.0058)	(0.0114)	(0.0062)
Num. Obs.	1402	1402	1049	1402	1402	1402	1049	1402
R^2	0.818	0.474	0.828	0.704	0.817	0.471	0.834	0.703
R^2 Within	0.001	0.005	0.000	0.006	0.001	0.000	0.037	0.000
Std. Errors	District	District	District	District	District	District	District	District
Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓

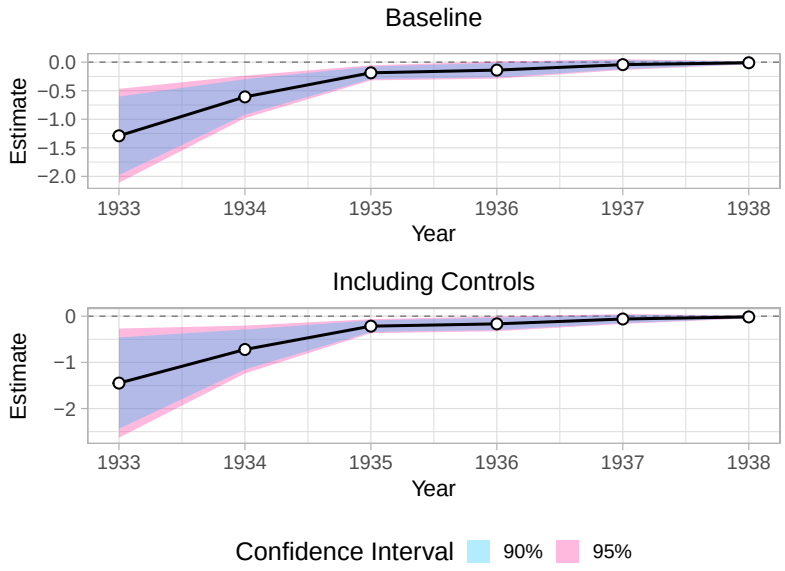
[1]*This includes estimated shadow budgets resulting from* Wechsel-*circulation.*
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Unemployment (Second Difference)

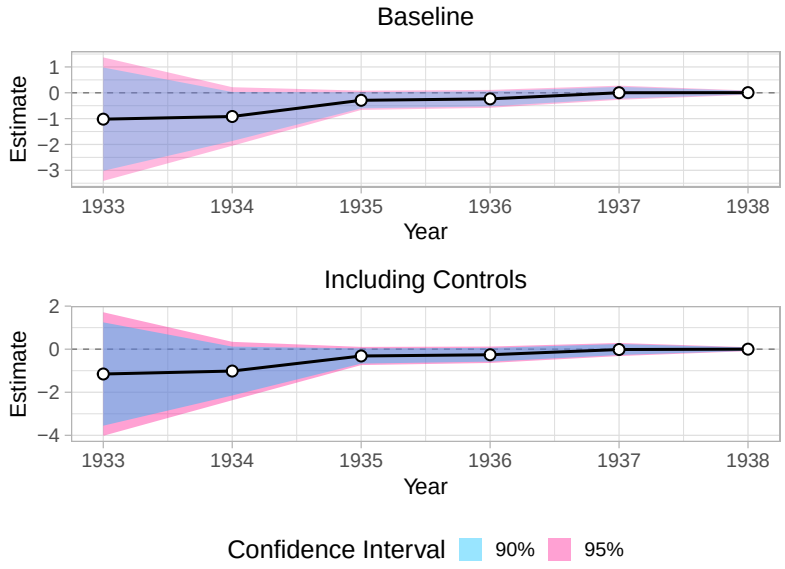
	Official				Estimated[1]			
	Insured	Crisis	Welfare	Ins. + Crisis	Insured	Crisis	Welfare	Ins. + Crisis
Panel A								
Exposure 1933	-0.0016	-0.0229	7.6746*	-0.0245	0.0043	-0.0059	0.0333*	-0.0016
	(0.0059)	(0.0229)	(4.1581)	(0.0209)	(0.0042)	(0.0101)	(0.0180)	(0.0086)
Num. Obs.	1050	1050	698	1050	1050	1050	698	1050
R^2	0.859	0.659	0.945	0.823	0.859	0.657	0.945	0.822
R^2 Within	0.000	0.008	0.077	0.006	0.002	0.002	0.077	0.000
Std. Errors	District	District	District	District	District	District	District	District
Panel B								
Exposure 1938	-0.0036	-0.0202	9.0806**	-0.0238	0.0015	-0.0067	0.0394**	-0.0052
	(0.0065)	(0.0227)	(3.9431)	(0.0247)	(0.0035)	(0.0105)	(0.0171)	(0.0100)
Num. Obs.	1050	1050	698	1050	1050	1050	698	1050
R^2	0.859	0.658	0.944	0.822	0.859	0.657	0.944	0.822
R^2 Within	0.000	0.004	0.067	0.004	0.000	0.001	0.067	0.001
Std. Errors	District	District	District	District	District	District	District	District
Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓

[1]*This includes estimated shadow budgets resulting from* Wechsel-*circulation.*
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

E Robustness



(a) Plants 1933



(b) Plants 1938

Figure A7: Including Industrial Exposure in Year-on-Year *Länder*-Regression

Table 9: Unemployment Relative to 1932. Panel Regression on the *Länder*-level

	Official				Estimated[1]			
	I	II	III	IV	V	VI	VII	VIII
Full Sample								
Plants 1933	0.0047	0.0013			0.0028	-0.0014		
	(0.0125)	(0.0128)			(0.0151)	(0.0154)		
Ind. Exp.		-0.0027		-0.0027		-0.0027		-0.0027
		(0.0024)		(0.0025)		(0.0024)		(0.0024)
Plants 1938			0.0213	0.0177			0.0155	0.0113
			(0.0317)	(0.0313)			(0.0372)	(0.0369)
Num. Obs.	108	108	108	108	108	108	108	108
R^2	0.952	0.959	0.953	0.960	0.952	0.959	0.953	0.959
R^2 Within	0.002	0.145	0.006	0.149	0.001	0.146	0.003	0.147
Std. Errors	Land	Land	Land	Land	Land	Land	Land	Land
Until 1936								
Plants 1933	-0.0884	-0.1100			-0.0356	-0.0450		
	(0.0791)	(0.0748)			(0.0346)	(0.0328)		
Ind. Exp.		-0.0030		-0.0029		-0.0030		-0.0029
		(0.0020)		(0.0020)		(0.0020)		(0.0020)
Plants 1938			-0.1919	-0.2110			-0.0798	-0.0881
			(0.1564)	(0.1579)			(0.0671)	(0.0675)
Num. Obs.	80	80	80	80	80	80	80	80
R^2	0.955	0.962	0.955	0.962	0.955	0.962	0.955	0.961
R^2 Within	0.025	0.177	0.028	0.172	0.021	0.172	0.025	0.168
Std. Errors	Land	Land	Land	Land	Land	Land	Land	Land
Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Control	X	✓	X	✓	X	✓	X	✓

[1] *Includes estimated shadow budgets resulting from* Wechsel-*circulation.*
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$