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The unemployment impact of the COVID-19 shutdown measures in Germany

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Articles on labour market issues

16|2020 The Unemployment Impact of the COVID-19 Shutdown Measures in Germany

Anja Bauer, Enzo Weber

The Unemployment Impact of the COVID-19 Shutdown Measures in Germany

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Enzo Weber (IAB)

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Abstract

This paper evaluates the short-term labour market impact of the COVID-19 shutdown measures in Germany. We take the closure of economic sectors such as restaurants and retail as a treatment, which enables difference-in-difference estimation. Additionally considering input-output linkages between the sectors, we find that 60 percent of the considerably increased inflows from employment into unemployment in April 2020 were due to the shutdown measures. In a second approach, we make use of the fact that sector closures and curfews were implemented at different times by the German state governments. In a regional regression setup based on treatment intensity, we find that the hiring margin accounted for additional 82 percent of the unemployment effect coming from the separations margin. In sum, the shutdown measures increased unemployment in the short run by 117,000 persons.

Zusammenfassung

Wir analysieren die kurzfristigen Arbeitsmarkteffekte der COVID-19 Shutdown-Maßnahmen in Deutschland. Mittels eines Differenzen-von-Differenzen Ansatzes, der auch die Verflechtung der Branchen über eine Input-Output Systematik berücksichtigt, zeigen wir, dass 60 Prozent der zusätzlichen Zugänge in Arbeitslosigkeit aus Beschäftigung zwischen März und April 2020 durch die Shutdown-Maßnahmen erklärt werden können. In einem weiteren Ansatz nutzen wir die zeitliche Variation in der Einführung von Branchenschließungen und Ausgangsbeschränkungen in den Bundesländern. Eine regionale Regression zeigt, dass unterlassene Einstellungen rund 82 Prozent der Wirkung vermehrter Zugänge in Arbeitslosigkeit ausmachen und dadurch die Arbeitslosigkeit zusätzlich erhöhen. Insgesamt haben die Shutdown-Maßnahmen kurzfristig zu einer Zunahme der Arbeitslosigkeit um 117.000 Personen geführt.

JEL

J06, E24 JEL J06, JEL E24

Keywords

COVID-19, treatment effect, unemployment COVID-19, treatment effect, unemployment

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1 Introduction

In spring 2020, the corona virus spread exponentially in many countries. During the second half of March, in Germany, as elsewhere, comprehensive containment measures were taken. In the public sector, for example, companies and institutions in sectors such as hotels and restaurants, retail or culture and leisure were closed. This was followed by contact restrictions and curfews. Weighing up the necessity of these steps and the economic and social damage they caused is now the subject of intense debate (compare, e.g., Baldwin 2020).

In this paper we determine the short-term effects of the shutdown measures on the labour market. Unemployment in Germany rose dramatically in April. We use detailed administrative data to determine the treatment effect of these measures on unemployment via difference-in-difference estimations. While the economy as a whole has been affected by the Corona crisis, in a second approach, we methodically take advantage of the fact that the containment measures were implemented by the German state governments at different times and not uniformly nationwide. We differentiate between economic closures and curfews. Constructing a comprehensive data set, the resulting regional variation in the introduction of the measures allows us to estimate the direct effects on regional unemployment flows representing a higher separation rate and a lower job finding rate.

We find that 60 percent of the considerably increased inflows into unemployment in April 2020 were due to the shutdown measures. Furthermore, the hiring margin accounted for additional 82 percent of the unemployment effect coming from the separations margin. In sum, the shutdown measures increased unemployment in the short run by 117,000 persons.

The paper is structured as follows. The next section presents the difference-in-difference approach. Section 3 evaluated the regional impact on separations and job findings. The last sections concludes.

2 Diff - in - Diff with Bite

For our first analysis we use data for the inflow of workers from employment to unemployment by regions and industries from the statistics of the Federal Employment Agency. For the industry classification we use the 2-digit level of the Germany industry classification (WZ08-Abteilung), for the regional level we choose the 16 federal states. We calculate a separation rate by using the inflows over the number of workers subject to social security contributions. The flow data is seasonally adjusted using Census X-13. Data for the stock of employment is only available with a lag of 6 months. To cancel out seasonality we use the yearly average of the number of workers from October 2018 to October 2019, which is the latest available information.

We use a difference-in-difference approach, distinguishing industries that are treated by the economic closures from the other industries. We use a special application of this approach by replacing the binary treatment by the "bite". We borrow this procedure from the literature that is concerned with the measurement of the effects of a nationwide minimum wage on employment (see, for instance, Card(1992) or a recent application from Caliendo et al. (2018)). First, we use assumptions about the degree of closure. For instance, we assume that services in the travel sector and services in recreation and sports were closed to 100 percent. Also the automobile industry[1] closed fully, however for "Wholesale and retail trade and repair of motor vehicles and motorcycles" we set the closure to 50 percent, approximating the share of trade while garages were still operating. Accommodation and Food and beverage service activities offered is one industry in our classification, and, because restaurants were allowed to offer take-away service, we assume a closure of this industry of 80 percent. For wholesale and retail we assumed 40.5 percent, as groceries, pharmacies, drug stores and gas stations, which already make up 50 percent in terms of sales, were still running during lockdown and faced an increase in demand. For land transport and transport via pipelines we set the rate to 32.8 percent, which stands for the majority of passenger services. Libraries, archives, museums and other cultural activities, Creative arts and entertainment activities and Gambling and betting activities in sum are closed to 70 percent, because most of the industries were closed by decree, except gambling. Other personal service activities is assumed to be closed about 58 percent which corresponds to the share of beauty treatments and hair dressers within the industry. Below 20 percent of closure was given to the industries of Education, Public administration and defence and compulsory social security, Motion picture, video and television programme production, sound recording and music publishing activities (standing for education beyond the schooling system and cinemas).

Second, we consider the share of the gross value added affected by the closures in the indus-

[1] While the automobile industry was not closed by decree, because of its factural shutdown we take it as treated (just as parts of transport.)

tries that were not directly treated. The logic behind is the following: While some industries are closed per decree, others were hit by these measures through their linkages to the closed industries. To account for the full extent, we generate the change in the gross value added of every industry caused by the closures via their linkages in an input-output table. A full list of the degrees of closure and the loss in value added including input-output linkages is given in the appendix.

In the difference-in-difference regression of the separation rate, we control for a comprehensive set of variables which stem from the Establishment History Panel (BHP)(see Ganzer et al. (2020) for a full description of the data set). The BHP is a cross sectional dataset that contains all the establishments in Germany which are covered by the IAB Employment History (BeH) [2] and have at least one employee liable to social security. We use the BHP to add information on the average share of certain worker groups in the establishments operating in the industries in the regions, information about the average wage structure and the age of the establishments. Furthermore, we control for the infection rate at the 13th of March. We choose this date as reference date because the inflows are counted between the 13th of March and the 14th of April. To account for differences in the regions (e.g. differences in unemployment) we include a set of region dummies. To account for differences in industries (e.g. export dependency), we include dummies on the 1-digit industry code.

Our estimation equation reads as follows:

$$s_{ijt} = \gamma_1 April_t + \gamma_2 Close_i + \gamma_3 April_t \times Close_i + \beta X_{ij} + u_{ijt}, \tag{2.1}$$

where s_{ijt} hold the separation rates in region i, industry j and time t (March, April 2020). $April$ is a time dummy that takes on the value of 1 in April 2020. As first closure measures came into force on March 13th, and the inflows in April are measured between 13th of March and 14th of April, the time dummy measures the post treatment time span. $Close$ is bounded between 0 and -1, showing the degree of industry value added affected by the closures. The treatment effect is given by the interaction term of $April$ and $Close$ with coefficient γ_3. This interaction measures the treatment effect because of the closure measures due to COVID-19. X holds the control variables with coefficient vector β, and u_{ijt} is an industry-and region-specific error term.

Table 1 shows the effects of interest. The closure measure increased the inflow into unemployment out of employment by 0.0075 percentage points. Expressed differently, a back of the envelope calculation, where we multiply the coefficient by the drop in output and weight

[2] For more information follow this link.

this expression with the number of employees subject to social security in the industry sectors, shows that the closure measures increased the unemployment inflow by about 53,000 people. In our data, this stands for 60 percent of the increase of inflows into unemployment in April 2020.

The additional inflows from all industries sum to 88,000 in our data. This is a bit lower than the overall number from the statistics of the Federal Employment Agency of 107,000 due to missings in industry classification codes. When we scale our number accordingly under the assumption that the missings are random, we arrive at an unemployment inflow due to the closures of 64,000.

Table 1: Inflows to unemployment from employment subject to social security contributions

	Inflow rate
treatment	-0.0007262
	(-9.82)
time	0.0007261
	(7.00)
time × treatment	-0.0075246
	(-25.70)

Note: T-values in parentheses.
Source: Statistics of the Federal Employment History; Establishment History Panel 2018, own calculations. ©IAB

3 Inflows vs. Outflows

Due to data limitations, by industry we only can observe the inflows into unemployment but not the outflows from unemployment. However, we are interested to which extent the two channels, namely separations and job findings, contribute to the rise in the unemployment stock. In order to analyse this question, we forgo the industry division and take a deeper look at these two channels using regional variation. As dependent variables we use the flows between employment and unemployment for the 156 Employment Agency districts. We consider the change in the seasonally adjusted separation rate (inflows into unemployment from the 1st labour market divided by the stock of employment subject to social security contributions) and job finding rate (outflows from unemployment into the 1st labour market divided by the stock of unemployment) from March to April 2020. Again, the change in these two variables is measured by taking stocks at the 12^{th} March to 14^{th} April, i.e. including the entire period of time of containment measures coming into force.

The flows show the labour market channels behind the unemployment increase, i.e. separations and new hires. As an additional advantage, they are not affected by special effects on the stock of unemployed: E.g., unemployment considerably increased in April due to exceptionally low outflows of unemployed to labour market policy measures.

As explanatory variables we use the number of days of economic closures in the sectors of public life and the number of days of curfews in the above-mentioned period. These were determined in the course of comprehensive research and compiled in a data set (Bauer/Weber 2020). Since all measures lasted at least until mid-April, the number of days reflect how early the measures came into force regionally. At the level of the Employment Agency districts, usually it is the decisions of the respective federal states that are relevant. However, there are also certain special measures in some districts. The data on industry closures were researched for the sectors of retail, accommodation, restaurants, bars / clubs, cinemas, trade fairs / events, other education, art / entertainment / recreation and hairdressers / cosmetics, and combined into one closure variable per district by averaging.

Considering the 156 districts, there are on average 26.7 closing days, with a standard deviation of 0.8. The average for the days of curfews is 21.1 days, with a standard deviation of 0.9. Table 1 shows the two variables aggregated at the level of the federal states.

We control several characteristics of the districts. The industry composition is taken into account via the proportions of employees subject to social security contributions according to the Germany industry classification on a 2-digit level (WZ08-Abteilung) with the most recent available status as of October 2019. The unemployment rate in March 2020 and its change since March 2019 reflect the regional labour market situation. Finally, the corona virus infec-

Table 2: Average number of days of economic closures and curfews

Federal State	Closure of economic sectors	Curfews
Baden Wuerttemberg	27	22
Bavaria	27	22
Berlin	28	21
Brandenburg	25	21
Bremen	26	20
Hamburg	28	21
Hesse	26	21
Mecklenburg-Western Pomerania	26	21
Lower Saxony	28	20
North Rhine-Westphalia	27	21
Rhineland-Palatinate	26	20
Saarland	26	22
Saxony	25	21
Saxony-Anhalt	26	21
Schleswig-Holstein	29	21
Thuringia	26	19

Note: Table 2 shows the average of the days measured up to the cut-off date (14 April 2020) across the agency districts in one federal state.It was rounded to full days.
Source: own calculations. ©IAB

tion rate is controlled by the confirmed infection cases per inhabitant from the Robert Koch-Institute directly before the first closures on 13 March.

The results of the regression are shown in Table 3. The variable of economic closures has an effect of +0.022 on the separation rate, which means that one more closing day represents a regional separation rate that is 0.022 percentage points higher. Extrapolated to the stock of employment subject to social insurance contributions in Germany, this would affect 7,400 persons. The curfews variable has an effect of +0.023. Here one day stands for a 0.023 percentage points higher separation rate, or 7,800 persons extrapolated nationwide.

On the job finding rate, the variable of economic closures has an effect of -0.192, i.e. one closing day leads to a 0.192 percentage point lower job finding rate. Recall that this rate is calculated on basis of the stock of unemployment and not as the separation rate, on the stock of employment. Logically, we extrapolate to the stock of unemployment for Germany. Then, 4,400 people would be affected. One additional day of curfews reduces the exit rate by 0.354 percentage points, or 8,100 people extrapolated nationwide.

It should be noted that the estimates determine the effects of one more day of closures/curfews compared to the other regions. It does therefore not represent an absolute effect that could be extended to any number of days, for instance until the end of the month. All taken together, additional days of economic closure and curfews have effects of a similar magnitude. Both channels operating via separations and new hires are affected. Sector closures and curfews taken together, the loss of new hires stands for an unemployment effect of an additional

Table 3: Regression of labour market flows on closing days

Dependent variable	Economic closures	Curfews
Separation rate	0.022	0.023
	(15.67)	(15.54)
Job finding rate	-0.192	-0.354
	(-19.48)	(-33.33)

T-values in parentheses.

Note: T-values in parenthesis.
Source: Statistics of the Federal Employment Agency, own calculations. ©IAB

82 percent of the effect coming from separations ($(4,400+8,100)/(7,400+7,800)$). When we apply this share to the above-mentioned inflow effect of 64,000, this stands for another 53,000 persons.

4 Robustness

Given the currentness of data, we cannot employ extensive robustness checks. However, note that we also performed classical diff-in-diff estimations with a binary treatment indicator, that takes on the value one, if the degree of closure is above 0 (see appendix). This regression also delivers statistically significant results. However, also this classical approach could potentially suffer from violations of the assumptions.

In further research we want to shed more light on the channel of hiring with data that allow to analyse effects on the hiring rate in regional and industrial dimensions. Furthermore we want to explore variations in the treatment effect by altering our bite measure. We acknowledge that, up to now, our bite measure is dependent on the assumption we make about the degree of closure which stems from a bundle of information. The measure could be refined, when information on losses between March and April is available. Also, our second approach would benefit from information on the completed length of closure within the districts. We think this is promising, as the government just recently decided to peg containment measures to infection rates, which implies that there will be much more variation in the days of closure within districts.

5 Conclusion

We evaluate the short-term labour market impact of the COVID-19 shutdown measures in Germany. We take the closure of economic sectors such as restaurants and retail as a treatment, which enables difference-in-difference estimation. Additionally considering input-output linkages between the sectors, we find that 60 percent of the considerably increased inflow into unemployment in April 2020 was due to the shutdown measures. This stands for 64,000 persons.

In a second approach, we make use of the fact that sector closures and curfews were implemented at different times by the German state governments. In a regional regression setup based on treatment intensity, we find that the hiring margin accounted for additional 82 percent of the unemployment effect coming from the separations margin. This stands for another 53,000 persons. Evidently, saving existing jobs e.g. via short-time work is not enough to prevent a severe labour market drop (Merkl/Weber 2020). In sum, the shutdown measures increased unemployment in the short run by 117,000 persons.

When assessing these results, two points should be kept in mind: First, the available data measure effects up to mid-April. However, later effects cannot be ruled out either, for example with regard to notice periods. Secondly, we consider immediate effects. Without the measures, however, the uncontrolled spread of the virus could possibly have caused much greater damage in the medium term.

Nevertheless, the presented results underline that within the framework of an opening strategy all possibilities must be explored on how the reactivation of economic activity can be made possible with a sufficient containment of the virus. The effects of these opening steps should be examined empirically on the basis of different regional configurations in order to collect evidence for the optimisation of further proceedings.

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Appendix

Input-Output Linkage

Table 4: Inflows to unemployment from employment subject to social security contributions

Code	"Classification of Products by Activity"	loss of value added	degree of closure
01	Crop and animal production, hunting and related service activities	-0,0064	0,0000
02	Forestry and logging	-0,0030	0,0000
03	Fishing and aquaculture	-0,1151	0,0000
05	Mining of coal and lignite	0,0000	0,0000
06	Extraction of crude petroleum and natural gas	-0,0070	0,0000
07-09	Mining and quarrying and mining support service	-0,0005	0,0000
10-12	Manufacture of food products, beverages, tobacco	-0,0425	0,0000
13-15	Manufacture of textiles and wearing apparel	-0,0227	0,0000
16	Manufacture of leather, wood and cork	-0,0357	0,0000
17	Manufacture of paper and paper products	-0,0303	0,0000
18	Printing and reproduction of recorded media	-0,0995	0,0000
19	Manufacture of coke and refined petroleum products	-0,0507	0,0000
20	Manufacture of chemicals and chemical products	-0,0109	0,0000
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0,0000	0,0000
22	Manufacture of rubber and plastic products	-0,1371	0,0000
23	Manufacture of other non-metallic mineral products -0,0388	0,0000	
24	Manufacture of basic metals	-0,1872	0,0000
25	Manufacture of fabricated metal products, except machinery and equipment	-0,1089	0,0000
26	Manufacture of computer, electronic and optical products	-0,0067	0,0000
27	Manufacture of electrical equipment	-0,0353	0,0000
28	Manufacture of machinery and equipment n.e.c.	-0,0171	0,0000
29	Manufacture of motor vehicles, trailers and semi-trailers	-1,0000	1,0000
30	Manufacture of other transport equipment	-0,0058	0,0000
31-32	Manufacture of furniture and Other manufacturing	-0,0008	0,0000
33	Repair and installation of machinery and equipment	-0,1089	0,0000
35	Electricity, gas, steam and air conditioning supply	-0,0609	0,0000
36	Water collection, treatment and supply	-0,0698	0,0000
37-39	Sewerage, Waste collection, disposal and remediation activities	-0,0524	0,0000
41	Construction of buildings	-0,0021	0,0000
42	Civil engineering	-0,0118	0,0000
43	Specialised construction activities	-0,0314	0,0000
45	Wholesale and retail trade and repair of motor vehicles and motorcycles	-0,7545	0,5000
46	Wholesale trade, except of motor vehicles and motorcycles	-0,4581	0,4050
47	Retail trade, except of motor vehicles and motorcycles	-0,4453	0,4050
49	Land transport and transport via pipelines	-0,5316	0,3280
50	Water transport	-0,0231	0,0000

Code	"Classification of Products by Activity"	loss of value added	degree of closure
51	Air transport	-0,9222	0,7500
52	Warehousing and support activities for transportation	-0,6988	0,5000
53	Postal and courier activities	-0,2115	0,0000
55-56	Accommodation and Food and beverage service activities	-0,8231	0,8000
58	Publishing activities	-0,0503	0,0000
59-60	Motion picture, video and television programme production and Programming and broadcasting activities	-0,0249	1,0000
61	Telecommunications	-0,0643	0,0000
62-63	Computer programming, consultancy and related activities and Information service activities	-0,0528	0,0000
64	Financial service activities, except insurance and pension funding	-0,0493	0,0000
65	Insurance, reinsurance and pension funding, except compulsory social security	-0,0471	0,0000
66	Activities auxiliary to financial services and insurance activities	0,0000	0,0000
68	Real estate activities	-0,0580	0,0000
69-70	Legal and accounting activities and Activities of head offices; management consultancy activities	-0,0711	0,0000
71	Architectural and engineering activities; technical testing and analysis	-0,0457	0,0000
72	Scientific research and development	0,0000	0,0000
73	Advertising and market research	-0,1372	0,0000
74-75	Other professional, scientific and technical activities and Veterinary activities	-0,0790	0,0000
77	Rental and leasing activities	-0,0913	0,0000
78	Employment activities	-0,1606	0,0000
79	Travel agency, tour operator and other reservation service and related activities	-1,0000	1,0000
80-82	Security and investigation, Services to buildings and landscape, office support and other business support activities	-0, 7670	0,1600
84	Public administration and defence; compulsory social security	-0,0114	0,0000
85	Education	-0,1399	0,1300
86	Human health activities	-0,0012	0,0000
87-88	Residential care activities and Social work activities without accommodation	0,0000	0,0000
90-92	Entertainment activities, Libraries, archives, museums and Gambling	-0,7180	0,7000
93	Sports activities and amusement and recreation activities	-1,0000	1,0000
94	Activities of membership organisations	-0,0335	0,0000
95	Repair of computers and personal and household goods	-0,0861	0,0000
96	Other personal service activities	-0,5967	0,5800
97-98	Activities of households, goods- and services-producing activities of private households for own use	0,0000	0,0000

Source: Federal Statistical Office. Own calculations. ©IAB

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