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Does government-backed lending prevent unemployment? An assessment of the Swiss COVID–19 lending program

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Does government-backed lending prevent unemployment? An assessment of the Swiss COVID–19 lending program*

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Abstract: This paper identifies the effect of variation in government-backed loan supply on unemployment exploiting regional variation in the Swiss COVID–19 lending program. The rules of the program introduce variation in loan supply across Cantons. This variation helps disentangling supply from demand effects. Higher loan supply reduces unemployment. Increasing the volume by CHF 100,000 saves between 0.22 and 0.29 jobs. Therefore, loan supply has to expand by between CHF 344,800 and CHF 454,500 to save one job. Taking into account that some of the borrowers default, saving one job costs the government between CHF 39,700 and CHF 52,400 per year. These costs are somewhat lower than unemployment benefits associated with the median income.

JEL classification: E24, E32, E44, E58, E62, E61, G21, G23, G28, H12, R12

Keywords: Government-backed lending, targeted lending, unemployment, COVID–19

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1 Introduction

In March 2020, the COVID–19 wave hits Switzerland at full force. Meanwhile, the owner of a small company in the city of Bern receives a phone call by an important client. The client announces to pay bills with a delay of three months instead of the usual one month. This is troubling news: wages have to be paid; raw material has to be ordered; rent is due each month. The owner decides to apply for a COVID–19 loan, a government-backed loan granted by her house bank. Half an hour later, she obtains an account with a credit line of CHF 40,000 at a 0% interest rate.

This true anecdote illustrates two important features of the Swiss COVID–19 lending program. First, it rapidly provided liquidity to small and medium-sized enterprises (SMEs). Second, firms more severely hit by the crisis were more likely to require a loan.

When assessing the Swiss government-backed lending program, we therefore face an identification problem: lending is driven by variation in demand as well as supply. In Cantons strongly hit by the health crisis and the lockdown, demand for credit is large. But those are the Cantons with a stronger increase in unemployment. Looking at the cantonal raw correlation of COVID–19 lending volume and unemployment we indeed observe a slightly positive relationship (see Figure 1, panel a).[1] In addition, the volume of COVID–19 loans was high in Cantons severely hit by the health crisis (panel b). The positive relationship between volume and unemployment therefore likely reflects variation in demand for credit and potentially masks the supply effect of the lending program, which is more relevant for policy makers.

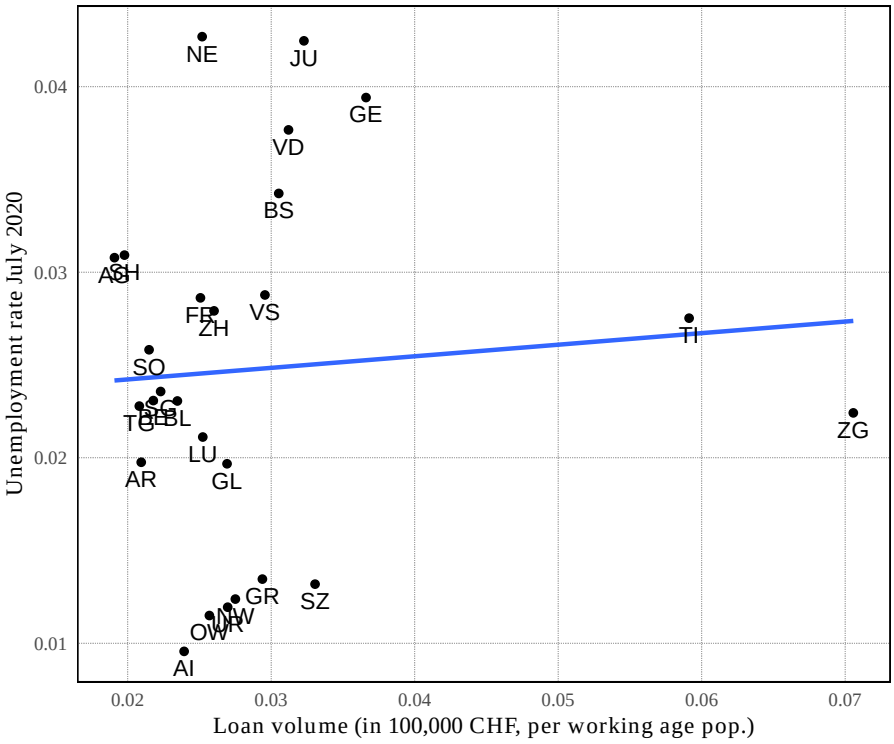
The aim of this paper is to identify the effect of variation in government-backed lending supply on unemployment. I exploit cantonal variation in COVID–19 loan supply to identify the impact of the program on unemployment. Loan supply is determined by a rule stating that, in the Base program, firms can borrow only 10% of their past revenues up to a maximum of CHF 500,000. In the Plus program, firms are able to obtain up to 20 mio. However, the Plus program is rarely used, possibly because the loans are guaranteed only up to 85%. Firms with revenues larger than 500 mio. are not eligible.

The rules of the COVID–19 lending program introduce variation in supply across Cantons. I therefore address the identification problem in two ways. First, I run OLS regressions of cantonal unemployment on loan volume, controlling for a range of covariates that reflect the

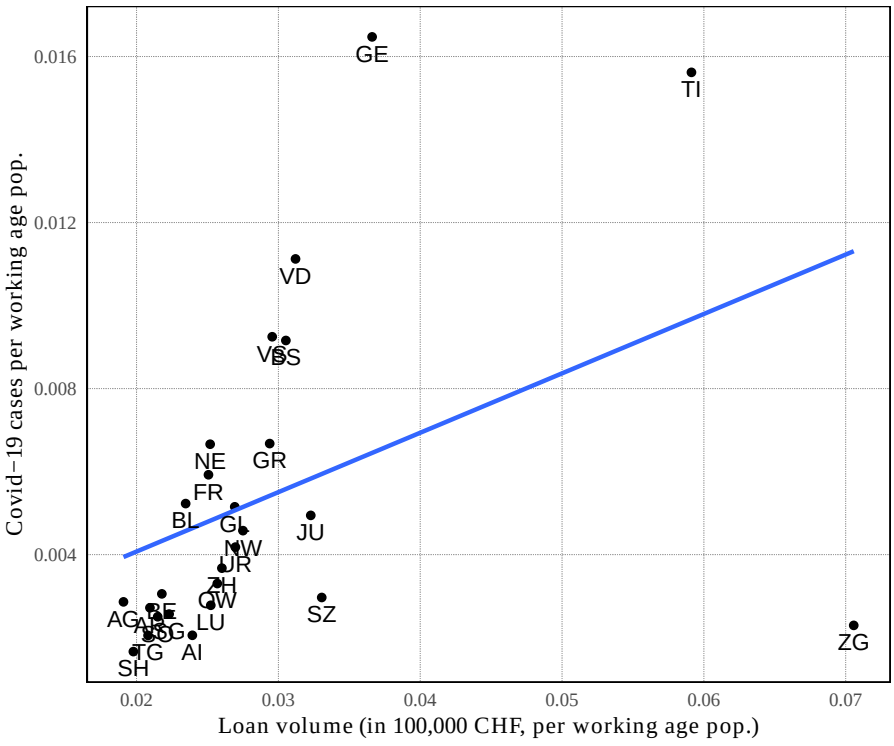
[1] Data and replication files are available on https://github.com/dankaufmann/COVID19lending.

Fig. 1: Unemployment, loans, and COVID–19 cases

(a) Loan volume and unemployment rate



(b) Loan volume and COVID–19 cases



Notes: The labels represent abbreviations for Swiss Cantons. See Appendix for data sources.

demand for COVID–19 loans (i.e. the number of COVID–19 cases, the number of firms closed due to the lockdown, the number of non-permanent residents, the number of workers on short-time work, the number of defaults in the previous year, a competitiveness index in the previous year, and the unemployment rate in the previous year). The remaining correlation between the loan volume and unemployment should mostly reflect variation in loan supply. Second, I construct instrumental variables (IVs) that are correlated with loan supply due to the rules of the COVID–19 program. One instrument is the number of SMEs in each Canton. The other instrument is an estimate of the maximum volume firms may borrow in each Canton based on 2018 firm-level data underlying the Swiss national accounts.

The main findings may be summarized as follows. In Cantons with higher lending supply, the unemployment rate is statistically significantly lower. The OLS estimates suggest that increasing the lending volume by CHF 100,000 saves 0.11 jobs. OLS may be biased if we fail to account for all factors driving loan demand. Indeed, according to the IV estimates, increasing the volume by CHF 100,000 saves between 0.22 and 0.29 jobs. Therefore, to save one job credit supply has to expand by between CHF 344,800 and CHF 454,500. Panel data estimates point to similar magnitudes, although the standard errors are substantially larger and the estimates are not significantly different from zero. In addition, a sensitivity analysis excluding one Canton at a time suggests that the results depend on Zug, a Canton with a particularly high number of SMEs.

To conduct a cost-benefit analysis, I use Bayes' rule to compute the probability that a firm defaults conditional on borrowing in the COVID–19 program. Multiplying this probability with the effect of loan supply yields an upper bound for the costs of saving one job. According to this back-of-the-envelope calculation, 11.5% of COVID–19 loan holders will enter default proceedings after one year. Therefore, one job saved increases costs the government at most between CHF 39,700 and CHF 52,400 per year. This is somewhat smaller than what a job lost costs in terms of unemployment insurance payments (80% of the median gross income amounting to CHF 68,800).

The paper is related to studies evaluating targeted lending programs of governments and central banks. Most of these papers focus on the effect on bank lending rather than on macroeconomic outcomes. Bats and Hudepohl (2019) use bank-level micro data to examine design choices of the European Central Bank's (ECB) longer-term refinancing operations (TLTROs) on bank lending. Andreeva and García-Posada (2019) use the ECBs bank lending survey to analyze the direct and indirect channels through which TLTROs increase bank

lending. Laine (2019) uses bank-level data for several countries to show that TLTROs increase the stock of corporate debt on banks balance sheets. There is no effect on lending for consumption, however. During the COVID–19 crisis, the Federal Reserve started to lend directly to non-bank corporations (Cheng et al., 2020, English and Liang, 2020).[2] Because these programs have only recently emerged, systematic evaluations are, to the best of my knowledge, still lacking. Therefore, this paper is one of the first to provide evidence on the macroeconomic impact of targeted lending programs.

From a methodological perspective the paper is closely related to Nakamura and Steinsson (2014) who identify the impact of fiscal policy shocks exploiting regional variation in government spending. They distinguish between aggregate and relative effects. The former take into account systematic responses of other policy makers, in particular monetary policy, to a change in regional fiscal policy. The latter hold aggregate policy responses constant. Using regional variation to estimate the impact of fiscal policy, or the impact of government-backed lending, purges the aggregate effects. Therefore the aggregate effects could be larger or smaller, depending on the response of fiscal and monetary policy.[3]

In what follows, I describe the main features of the Swiss COVID–19 lending program. Afterward, I explain how to exploit these features to identify the impact of variation in loan supply before I discuss the results. The last section concludes.

2 The COVID–19 lending program

In the COVID–19 emergency ordinance, the Swiss Confederation created a lending program to rapidly provide liquidity to SME hit by the COVID–19 crisis (Federal Council, 2020b).[4] In the two pillars of the program, Base and Plus, the Swiss Confederation guarantees loans granted by commercial banks targeted specifically at SMEs. In addition, four Swiss loan guarantee cooperatives are responsible for issuing the guarantees and the Swiss National Bank (SNB) provides liquidity to commercial banks.

A firm experiencing losses because of the COVID–19 crisis completes a form on COVID19.easygov.swiss and sends it to its house bank. The bank then checks whether some minimum requirements are met. Afterward, the firm receives a loan (or credit line) within several hours.

[2] These programs are called Primary Market Corporate Credit Facility, Secondary Market Corporate Credit Facility, and Main Street Lending Program.

[3] For example, the central bank may feel less obliged to cut interest rates because the lending program supports the economy. If this is the case, the aggregate effects are smaller than the relative effects.

[4] The emergency ordinance will be incorporated into ordinary law (Federal Council, 2020a). The new law will differ in some aspects, which are still subject to discussion in parliament. Therefore, this section focuses on the emergency ordinance.

The volume amounts to a maximum of 10% of revenues in 2019 (or 2018) up to a maximum of CHF 500,000.[5] The interest rate amounts to 0% in the first year, and the maximum duration is 5 years.[6] One of four loan guarantee cooperatives then issue a guarantee for the loan; these organizations are supported by the Swiss government and facilitate SME's access to bank credits in general. The difference with respect to a normal guarantee of these organizations is that the Swiss Confederation covers 100% of losses on guarantees for COVID–19 loans in the Base program.

If a firm requires a higher loan it files a request in the COVID–19 Plus program for the amount exceeding CHF 500,000. The most important differences with respect to the Base program are that the maximum volume amounts to CHF 20 mio.[7] In addition, the Swiss Confederation covers only 85% of losses on the guarantees issued by the loan guarantee cooperatives. Because there is a credit risk, the commercial bank runs a credit-scoring, that may take several days, and is compensated with an interest rate of 0.5% on the guaranteed part of the loan.[8] In addition, the request has to be approved by a loan guarantee cooperative.

The SNB ensures that the liquidity problems of the SMEs do not spill over to the banking sector. In the COVID–19 Refinancing Facility (CRF), the SNB provides additional liquidity to commercial banks, accepting COVID–19 loans as collateral. The SNB is only willing to do so because these loans are backed by the Swiss Confederation and therefore the default risk is comparable to a Swiss government bond.

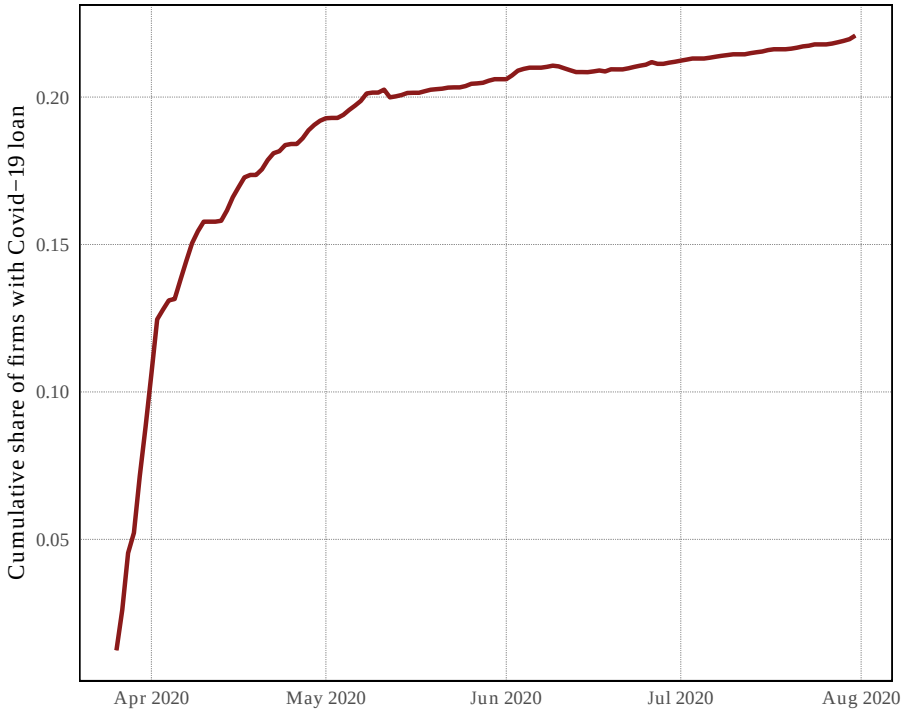
By mid-August, the total volume of the COVID–19 lending program (Base and Plus) amounted to more than CHF 16.5 bio. (more than CHF 22,000 per firm; more than CHF 123,000 per contract).[9] More than 22% of all Swiss firms received a loan (see Figure 2). The first loans were granted on 26 March, one day after the emergency ordinance was published. Afterward, we see a steep rise. Indeed, most of the requests were filed in March and April.[10]

The intention of the program was to support SMEs. This is ensured by the rule that only 10% of previous annual revenues up to a maximum of CHF 500,000 are fully backed by the government. Panel (b) shows that SMEs indeed received the ove rwhelming share of loans, both in terms of volume and number. In addition, the COVID–19 Plus program was less

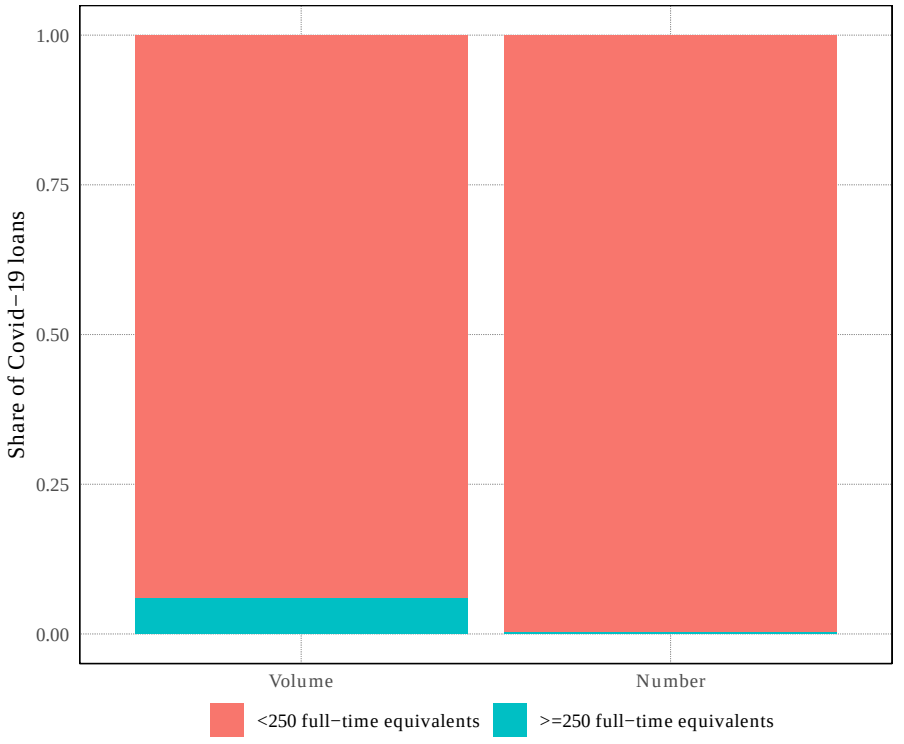
[5] Firms can also report an estimate of revenues for 2020. However, I suspect that most firms report 2019 figures because revenues declined during the health crisis.
[6] The interest rate can be changed each year by the Swiss Confederation. The duration can be increased to 7 years under particular circumstances. See Federal Council (2020b).
[7] But it still cannot exceed 10% of revenues.
[8] On the remaining part, the bank is free to charge any interest rate.
[9] These figures stem from Federal Department of Finance (2020).
[10] The cumulative share can decline because some demands were rejected later on.

Fig. 2: Timing and distribution of loan program

(a) Share of firms receiving COVID–19 loan



(b) Distribution according to firm size



Notes: See Appendix for data sources.

important. Only 0.8% of the number of loans (18% of the volume) were granted under the Plus program.

Whether firms spent the loans and used the credit lines remains an open question. We have some imperfect indirect evidence on whether firms used their credit lines or received actual loans. The reason is that the SNB does not accept unused credit lines as collateral in the CRF.[11] Therefore, the amount of CRF gives a rough idea whether the COVID–19 credit lines were used in practice. This is an imperfect measure for two reasons. First, the CRF comprises not only used credit lines, but also loans that may not have been used. Second, banks may not use all of the COVID–19 loans to obtain additional liquidity at the SNB. At the end of June 2020, the CRF volume amounts to CHF 10.1 bio. Therefore, 68% of the COVID–19 volume is used to obtain additional liquidity. Less than 1/3 of the total COVID–19 volume therefore consists of unused credit lines.

3 Method

Did the COVID–19 lending program save jobs? To answer this question, this section proposes to exploit cantonal variation in loan supply to estimate the impact on the unemployment rate.

3.1 Identification

As shown in Figure 1, the raw correlation between the volume of credits and the unemployment rate is mildly positive. This correlation is likely driven by demand and supply effects. Loan demand varies because the impact of the health crisis and the impact of the lockdown measures differ across Cantons. Loan supply varies because some Cantons have a higher share of SMEs than others.

I pursue two approaches to address the identification problem. First, I estimate a regression equation with a range of control variables for credit demand:

$$u_c = \alpha + \beta V_c + \mathbf{X}_c \mathbf{\Gamma} + \varepsilon_c \ ,$$

where u_c represents the registered unemployment rate for Canton c (in July), V_c is the cumulative loan volume (in June, in CHF 100,000), $\mathbf{X}_c$ is a matrix of control variables, and

[11] I thank Maxime Botteron for bringing this fact to my attention.

ε_c is an error term.[12] All variables are normalized by the working age population in 2020.[13] Therefore, β measures the marginal impact of a CHF 100,000 increase in the loan volume (per working age person) on unemployment (on the unemployment rate). The control variables are chosen to be correlated with the demand for COVID–19 loans and other factors potentially explaining differences in unemployment across Cantons. They include the cumulative number of COVID–19 cases (in June), the estimated number of workplaces closed because of the lockdown (in May), the number of non-permanent residents (in Q1), the number of workers on short-time work (in May), the unemployment rate in the previous year (in July), the number of defaults in the previous year, and a composite competitiveness index for the previous year.[14] Controlling for the number of employees on short-time work is particularly important, for two reasons. First, it is a measure of how hard a Canton was hit by the crisis, and therefore it is correlated with loan demand. Second, Siegenthaler and Kopp (2019) report relevant differences in cantonal approval practices for short-time work, which may be correlated with the firm structure.

Alternatively, we can set up a panel data model:

$$u_{c,t} = \alpha_i + \theta_t + \beta V_{c,t} + \mathbf{Y}_{c,t}\mathbf{\Gamma} + \varepsilon_{c,t} \quad t \in \{2019, 2020\} \ ,$$

where α_i and θ_t are fixed- and time-effects, respectively. The advantage is that we can control for time-constant unobserved differences across cantons. The disadvantage is that the set of covariates available is smaller. I therefore provide estimates based on both approaches.

Tab. 1: Definition of maximum loan supply

Firm revenue	Base Program	Plus Program
0-5 mio.	10% of revenue.	
5-200 mio.	500,000	10% of revenue. − 500,000
200-500 mio.	500,000	19,500,000
> 500 mio.	0	0

Notes: To construct the maximum supply by Canton, the SFSO computed the maximum amount each firm may obtain based on revenue in 2018. The maximum amount is determined by the features of the COVID–19 lending program shown in the table. The firm-level revenue stems from the production and value added statistics survey, the data underlying the Swiss national accounts (SFSO, 2020). For each firm in the survey the SFSO computed the amount the can borrow under the COVID–19 Base and Plus Programs. Then, they aggregate this firm-level information to representative cantonal aggregates using the sampling weights from the survey.

[12] The month of various covariates differs because of publication lags.

[13] The cantonal working age population for 2020 is linearly extrapolated based on data until 2018. Also, I use the same figures to compute the unemployment rate. Because the working age population changes only gradually the results are similar when using the working age population for 2018.

[14] See Appendix for all data sources.

If we fail to control for all relevant variation in loan demand OLS suffers from an omitted variable bias. I therefore additionally pursue an IV approach. I exploit that the COVID–19 lending program was particularly geared towards SMEs, and the maximum amount was determined by revenues before the crisis. I therefore use the number of SMEs in each Canton as an instrument.[15] In addition, the Swiss Federal Statistical Office (SFSO) computed an estimate of the maximum amount of COVID–19 loans firms can receive in each canton based on data underlying the national accounts for 2018 (see Table 1).[16] These computations are done with firm-level data and then aggregated to representative cantonal statistics. The advantage of the first instrument is that we can accurately estimate the share of SME in 2017. The advantage of the second instrument is, that it more closely mirrors the actual variation in supply across Cantons. However, because for some Cantons the number of observations is relatively small, sampling error may reduce the explanatory power of the instrument. Both instruments assume that the firm-structure remained relatively constant between 2017 (2018) and 2020. In the baseline estimates I exclude the COVID–19 Plus program from the instrument because it was quantitatively less important.

Figure 3 shows the relationship between the instruments and the actual credit volume. The instruments are indeed positively correlated with the credit volume. The actual volume is highest in the Cantons of Zug (ZG) and Ticino (TI). Both Cantons have a high number of SMEs. In addition, Zug has a particularly large maximum loan supply. Cantons like Solothurn (SO) and Aargau (AG) received a low volume of COVID–19 loans. These are Cantons with a small number of SMEs.

But to be valid instruments, the number of SMEs and the maximum loan volume has to be uncorrelated with all determinants of credit demand. Unfortunately, we cannot test this necessary condition. However, the COVID–19 crisis has not particularly hit Cantons with many SMEs. Rather, Cantons with borders to Italy (e.g. Ticino, Valais) or France (e.g. Geneva, Vaud, Basel) were more strongly hit by the crisis (see Figure 1). In addition, Cantons with many non-permanent residents and cross border workers (e.g. Ticino, Geneva, Basel) were more strongly hit than rural Cantons inside of Switzerland. In addition, the instruments are based on the firms' situation before the pandemic.

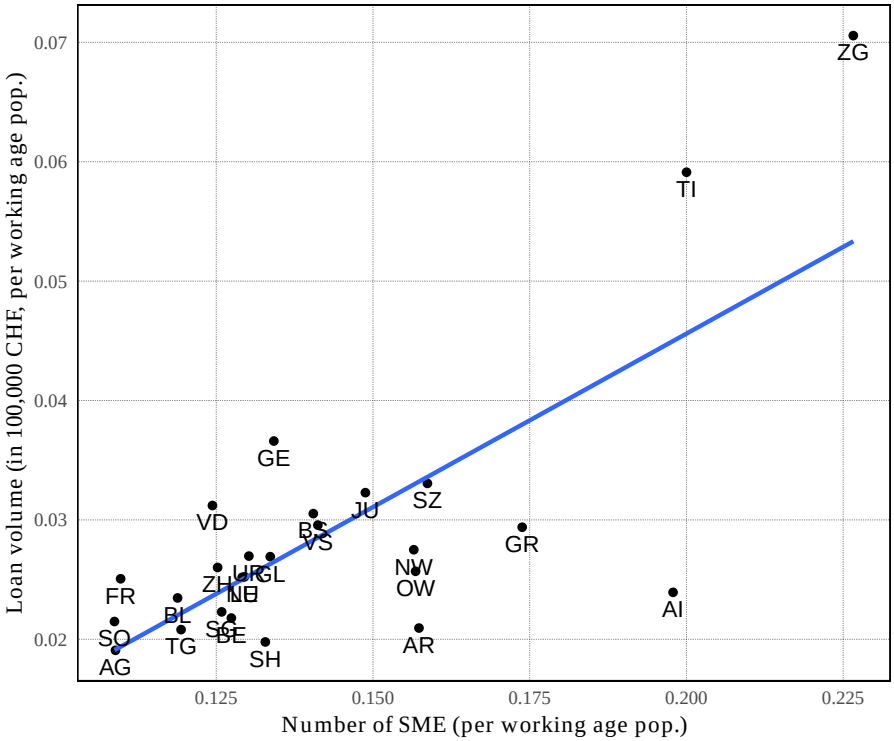
It is still possible that, conditional on the severity of the COVID–19 crisis, SME have a systematically higher demand for loans than large companies. Indeed, this may have been

[15] The figures are linearly extrapolated based on data from 2011-2017. I only obtained the number of cantonal workplaces rather than firms. Firms may have multiple workplaces in different Cantons. However, 89% of all firms in 2017 have only one workplace. For SMEs, this share is probably much higher.

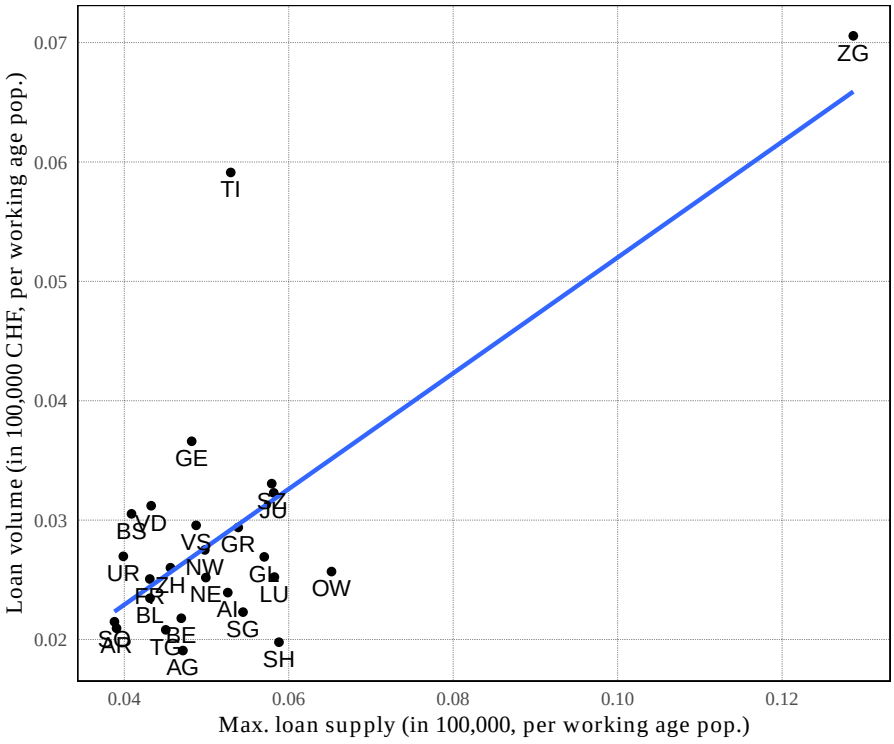
[16] I cordially thank the SFSO for providing these data upon request.

Fig. 3: Correlation between loan volume and instruments

(a) Number of SMEs and loan volume



(b) Maximum and actual loan volume



Notes: The labels represent abbreviations for Swiss Cantons. See Appendix for data sources.

the motivation to gear the COVID–19 lending program towards SMEs. If this is the case, the IV estimates provide a lower bound for the true effect of a change in loan supply.

4 Effect of government-backed lending on unemployment

Table 2 shows the main results. Inference is based on heteroskedasticity-consistent standard errors using a degrees of freedom adjustment (MacKinnon and White, 1985). The first column shows the unconditional correlation between the volume of credit and the unemployment rate is small, positive, but not significantly different from zero. Column (2) adds control variables. If they are statistically significant, they have the expected sign. Cantons with more non-permanent residents are strongly hit by the health crisis and therefore experience higher unemployment. Cantons with more people on short-time work are also more strongly hit by the crisis. Finally, the unemployment rate in the previous year is highly statistically significant because unemployment across Cantons differs for structural reasons that are persistent over time.

After adding the control variables we find a statistically significant effect of the loan volume on unemployment (-0.11). Therefore, increasing the loan volume by CHF 100,000 reduces unemployment by 0.11 persons. The inverse of this coefficient multiplied by $-100,000$ measures, how much the loan supply has to be increased to save an additional job. According to the OLS estimate, the loan volume has to increase by more than CHF 909,100.

Columns (3) to (5) show the IV estimates. The number of SMEs appears to be a relevant and strong instrument (column 3). The maximum loan supply estimate is less strongly correlated with the loan volume (column 4). The p-value amounts to 16%. Using both instruments we do not reject the overidentifying restrictions at the 5% level (column 5).

The IV estimates confirm that COVID–19 loans reduced unemployment. The effects are larger in absolute size than the OLS estimate. Focusing on the estimates where the specification tests pass, increasing loan supply by CHF 100,000 reduces unemployment by between 0.22 and 0.29 persons. To save an additional job, loan supply has to be increased, depending on the model specification, by CHF 344,800 and CHF 454,500.

4.1 Panel data analysis

Alternatively, we can set up a panel data model controlling for fixed- as well as time-effects. The point estimates of the OLS and IV regressions are similar (Table 3). However, the estimates are much less precise. The coefficient on the loan volume is borderline significant only after

Tab. 2: Effect of loan volume on unemployment rate

	Dependent variable: Unemployment rate July 2020				
	OLS	OLS	IV	IV	IV
	(1)	(2)	(3)	(4)	(5)
Volume (Until June, in CHF 100,000)	0.06	−0.11***	−0.29**	−0.18***	−0.22***
	(0.09)	(0.04)	(0.11)	(0.05)	(0.07)
Covid-19 cases (up to June)		−0.24	−0.25	−0.24	−0.25
		(0.16)	(0.25)	(0.19)	(0.21)
Firms in lockdown (May)		−0.10	0.08	−0.03	0.01
		(0.45)	(0.46)	(0.45)	(0.44)
Non-permanent residents (Q1)		0.12**	0.18**	0.14**	0.15**
		(0.05)	(0.08)	(0.06)	(0.07)
Employees on short-time work (May)		0.01**	0.03***	0.02***	0.03***
		(0.01)	(0.01)	(0.01)	(0.01)
New default proceedings (2019)		0.92	1.71*	1.23*	1.40*
		(0.63)	(0.92)	(0.67)	(0.76)
Competitiveness (0-1, 2019)		−0.001	0.01	0.002	0.003
		(0.003)	(0.004)	(0.003)	(0.003)
Unemployment rate (July 2019)		1.33***	1.23***	1.29***	1.27***
		(0.10)	(0.14)	(0.12)	(0.12)
Constant	0.02***	0.002	−0.001	0.001	0.0001
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Instrument			Share SME	Max. supply	Both
Irrelevant instrument (p-val.)			19.09	2.19	10.96
			0.00	0.16	0.00
Weak instrument (p-val.)			15.48	23.01	14.51
			0.00	0.00	0.00
Overidentifying restrictions (p-val.)					3.49
					0.06
N	26	26	26	26	26
R^2	0.01	0.98	0.96	0.97	0.97
Adjusted R^2	−0.04	0.96	0.94	0.96	0.96

Notes:
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Heteroskedasticity-consistent standard errors in parentheses.
All variables normalized by the working age population.

excluding non-significant controls and only using OLS.

Tab. 3: Effect of loan volume on unemployment rate (panel data)

	Dependent variable: Unemployment rate July				
	OLS	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)
Volume (Until June, in CHF 100,000)	−0.02	−0.08	−0.25	−0.07*	−0.19
	(0.03)	(0.06)	(0.18)	(0.03)	(0.13)
Covid-19 cases (up to June)		0.32*	0.40	0.35***	0.50**
		(0.18)	(0.29)	(0.12)	(0.25)
Employees on short-time work (May)		0.01	0.02		
		(0.02)	(0.02)		
Firms in lockdown (May)		−0.42	−0.06		
		(0.64)	(0.75)		
Instrument			Share SME		Share SME
N	52	52	52	52	52
R^2	0.003	0.22	0.16	0.16	0.12
Adjusted R^2	−1.12	−0.90	−1.04	−0.87	−0.95

Notes:
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Heteroskedasticity-consistent standard errors in parentheses.
All variables normalized by the working age population.
All specifications include time and fixed effects.

4.2 Sensitivity analysis

Figure 4 shows that there are Cantons which are particularly affected by the COVID–19 crisis and/or have a very high share of SME. I therefore perform a sensitivity analysis. This analysis serves to purposes. First, I use an robst estimator to show that the main results are not driven by outliers. Second, I exclude one Canton at a time from the regressions to show which Cantons drive the regional variation introduced by the lending program.

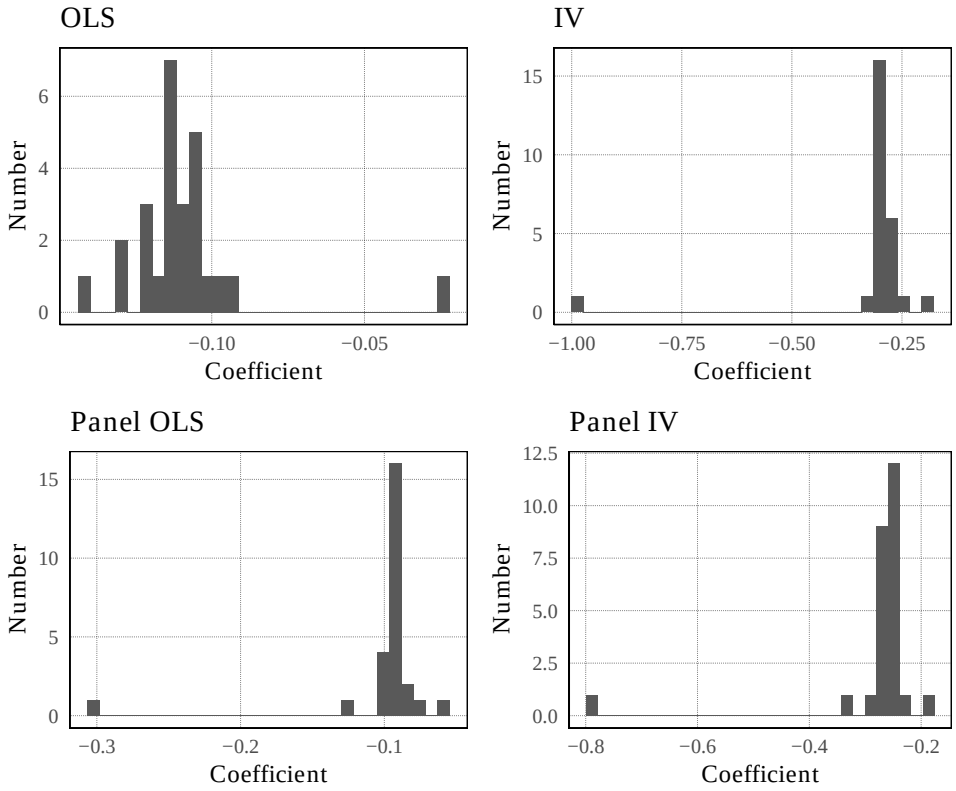
First, I estimate the OLS regressions with an outlier-robust estimator (Yohai, 1987). The point estimate amounts to -0.1 and the coefficient is statistically significant at the 5% level. Therefore, the results are very similar to the non-robust OLS estimates. This shows that the main results are not driven by outliers.

Second, I estimate the four models (OLS, IV, and the two panel data models), excluding one Canton at a time. This exercise demonstrates which Cantons received a particularly large volume of COVID–19 loans and therefore introduce the variation that I exploit to identify the effect. Figure 4 shows the distribution of point estimates and t-statistics.[17] For OLS and IV

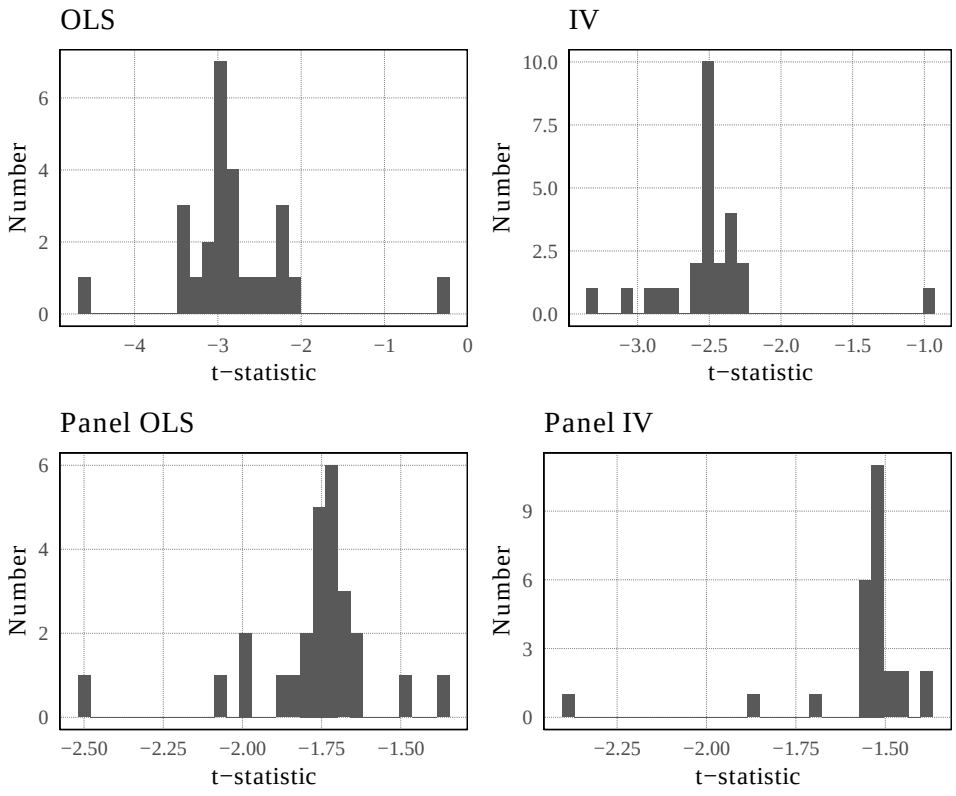
[17]For the IV estimates, I use the share of SME as instrument.

Fig. 4: Histograms excluding one Canton

(a) Coefficients



(b) t-statistics



Source: The histograms show coefficient estimates and robust t-statistics of estimates excluding one Canton at a time. The t-statistics are based on heteroskedasticity-consistent standard errors.

all but one of the estimates are similar to the full data set and statistically significant. When excluding the Zug the relationship breaks down for OLS and IV. The panel estimates we observe the opposite. When excluding Zug, the effect becomes larger in absolute value and is statistically significant.

Therefore, the sensitivity analysis shows that the strong variation in loan supply introduced by Zug matters for the results. On the one hand, it is not surprising, perhaps, that the results change when excluding single Cantons given the small number of observations. On the other hand, it suggests that the variation in loan supply across Cantons is relatively weak, except for the Canton of Zug, which received a particularly large loan volume and therefore allows identifying an effect.[18]

4.3 Costs and benefits

At first sight, increasing loan volume by more than CHF 300,000 (about € 280,000, $ 330,000) for saving one job seems an expensive policy.[19] Indeed, the gross median income in Switzerland amounts to CHF 68,800 and the unemployment insurance compensates 80% of the last income. However, this comparison neglects that the government only provides guarantees; thus these figures do not represent outright government spending.

Therefore, we have to compare the benefit (saving a job) against the likely cost (losses due to defaults on COVID–19 loans).[20] This exercise requires an estimate of the conditional default probability of a COVID–19 loan. Let $P(D|C)$ be the probability that a firm defaults (D), given that it holds a COVID–19 loan (C). Using Bayes' rule we obtain:

$$P(D|C) = \frac{P(C|D) \times P(D)}{P(C)} \quad ,$$

where $P(C)$, $P(D)$ denote the unconditional probabilities that a firm obtains a loan and defaults, respectively, and $P(C|D)$ stands for the probability that a firm holds a COVID–19 loan given that it defaults. Arguably, $P(C|D)$ is high, that is close to 1, because a firm is unlikely to default before obtaining a government-backed loan at a low interest rate. We can estimate $P(C)$ by the fraction of firms that obtain a COVID–19 loan, and $P(D)$ as the usual share of firms in default. Because both shares have the same denominator (the number of firms), and assuming that

[18] We indeed need such regional variation for identifying an effect at all. Imagine SME, and therefore loan supply, is uniformly distributed across Cantons. Then, there would be not regional variation that we can exploit for identifying the effect of loan supply.

[19] In what follows, I focus on the IV estimates for which the specification tests reject a weak or irrelevant instrument.

[20] This exercise neglects whether it is worth saving a job or whether it is more efficient for workers in sectors unlikely to recover to quickly adapt to the new circumstances. Such an assessment requires a structural model and is beyond the scope of this empirical exercise.

$P(D|C) = 1$, the conditional probability of default is the ratio between the number of defaults and the number of COVID–19 loans:

$$P(D|C) = \frac{D}{C} \quad .$$

In early August, the number of firms holding a COVID–19 loan amounts to 135,987. Moreover, the average number of new bankruptcy proceedings in 2019 between 2017 and 2019 amounts to 15,666. The conditional probability of default after one year therefore amounts to 11.5%.[21]

This back-of-the-envelope calculation shows saving a job through a government-backed lending program costs the government between CHF 39,700 and CHF 52,400 per year. This is somewhat lower than what the Swiss unemployment insurance pays for an unemployed person earning the median salary (CHF 55,000). In addition, this is an upper bound for the likely loss of the government, for four reasons. First, $P(C|D)$ cannot exceed unity. If this probability is lower, that is, if some firms default without borrowing in the loan program, the loss of the government is smaller. Second, we assume that the government has to pay out the entire guarantee. It is more likely that the loan guarantee cooperatives are at least partly repaid in the default proceedings. Third, we do not take into account that some firms will repay their loans before the end of the year. Fourth, the existence of the COVID–19 lending program may lower $P(D)$, the unconditional probability of default.

5 Concluding remarks

I estimate the effect of government-backed lending supply on unemployment using regional variation in the Swiss COVID–19 lending program. To disentangle supply and demand effects, I exploit that the rules of the program favor Cantons with a high share of SMEs in 2019. The rules therefore introduce regional variation in credit supply.

Higher lending supply reduces unemployment. Increasing the volume by CHF 100,000 saves between 0.22 and 0.27 jobs. Therefore, to save one job, supply has to expand by between CHF 344,800 and CHF 454,500. At first sight these figures seem large. However, taking into account that only some of these firms will default, saving one job costs the government at most between CHF 39,700 and CHF 52,400 per year.

This paper demonstrates that a government-backed lending program can save jobs during

[21] The Federal Finance Administration (2020) mentions a default probability of 10-20%, or losses Between CHF 1.5 and CHF 3 bio.

a pandemic. It also shows that a coordinated response of the government and the private sector enables fast liquidity provision to SMEs. Going forward, it will be important to assess whether the program saved the jobs permanently. This open question, however, is left for future research.

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Appendix

Tab. 4: Data sources

Variable	Source	URL	Comments
Unemployment	SECO	https://www.amstat.ch/	July
COVID–19 loans	SECO	https://COVID19.easygov.swiss/en/for-media/	Time series (mid-August) and cantonal data (end of June)
Number SME	SFSO, own calc.	https://www.bfs.admin.ch/bfs/en/home/statistics/catalogues-databases.assetdetail.9366316.html	Cantonal data. Workplaces rather than firms. Linear extrapolation based on 2011-2017 data. Missing data due to small number of observations replaced by 2
Maximum loan volume	SFSO		Cantonal data based on firm-level data underlying the national accounts for 2018
Short-time work	SECO	https://www.amstat.ch/	Employees. Time series and cantonal data (May)
Cumulative COVID–19 cases	FOPH	https://www.bag.admin.ch/bag/en/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/situation-schweiz-und-international.html	End of June
Number of firms closed in lockdown	SFSO	https://www.bfs.admin.ch/bfs/de/home/statistiken/industrie-dienstleistungen/unternehmen-beschaeftigte/wirtschaftsstruktur-unternehmen.assetdetail.12927653.html	Estimate (May)
Non-resident population	SFSO	https://www.bfs.admin.ch/bfs/en/home/statistics/population/effectif-change/population.html	Q1 2020
New default proceedings	SFSO	https://www.bfs.admin.ch/bfs/de/home/statistiken/industrie-dienstleistungen/unternehmen-beschaeftigte/unternehmensdemografie/konkurse.html	Cantonal and aggregate data. 2017-2019
Working age population	SFSO	https://www.bfs.admin.ch/bfs/en/home/statistics/population.assetdetail.9466879.html	Linear extrapolation based on data from 2011-2018
Competitiveness index	UBS	https://www.ubs.com/global/de/media/display-page-ndp/de-20190519-staf.html	2019
Number of firms	SFSO	https://www.bfs.admin.ch/bfs/de/home/statistiken/industrie-dienstleistungen/unternehmen-beschaeftigte/wirtschaftsstruktur-unternehmen.assetdetail.9366284.html	Linear extrapolation based on 2011-2017 data
CRF volume	SNB	https://data.snb.ch/de/topics/snb#!/cube/snbbipo?fromDate=2020-01&toDate=2020-12&dimSel=D0(GD)	Secured loans. June
Gross median income 2019	SFSO	https://www.bfs.admin.ch/bfs/en/home/statistics/work-income/wages-income-employment-labour-costs.assetdetail.13127540.html	2019

Notes: SECO: State Secretariat for Economic Affairs; FOPH: Federal Office of Public Health; SFSO: Swiss Federal Statistical Office; SNB: Swiss National Bank.