

Corona Crisis and Excess Mortality of Firms: Monitoring Firm Bankruptcies and Formations in Switzerland

A Joint Project by Bisnode D&B and KOF, ETH Zurich*

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Abstract

This paper presents unique time series on the frequency of bankruptcies and new formations of companies in Switzerland going back to the year 2006. We propose to assess the frequency of corporate bankruptcies over time using the concept of excess mortality. We find that the Corona Crisis has, for the time being, not been causing a wave of bankruptcies at the national level. At the cantonal level, only the canton of Valais recorded in the past months a bankruptcy frequency that was well above trend, although there was no significant excess mortality. At the sectoral level, the crisis had a stronger impact on the incidence of bankruptcies in the wholesale and retail trade industries than in the rest of the Swiss economy.

JEL classifications: E32, G33

Keywords: Corona Crisis, firms, excess mortality, bankruptcy, new firm formation

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1 Introduction

Many Swiss firms have been hit hard during spring 2020 by the lockdown and by households' consumption restraint in response to the spread of the SARS-CoV-2 virus and the advices on social distancing. Profits and demand expectations have collapsed and the uncertainty on the business outlook has risen strongly.¹ These factors contribute to the risk that the number of firm bankruptcies will increase in the future. On the other hand, the COVID-19 lending programme of the Swiss government offers firms the possibility to circumvent liquidity shortages, which likely reduces the number of bankruptcies at least in the short run. A general challenge regarding the assessment of the development of business failures is that the frequency of bankruptcies fluctuates strongly even in normal times.

To overcome this challenge, we collect all bankruptcy cases recorded in the Swiss Official Gazette of Commerce (Schweizerisches Handelsamtsblatt, Feuille officielle suisse du commerce, Foglio ufficiale svizzero di commercio) during the past years. We then construct monthly time series on the frequency of firm bankruptcies in the 8 Swiss Greater Regions, in the 26 Swiss cantons, and in the different industries of the Swiss economy since the year 2006 as well as in overall Switzerland since the year 2000. Using these series we identify periods of significant *excess mortality* of firms and periods of significant *undermortality* of firms, where significant excess mortality (undermortality) is defined as a situation when the frequency of firm bankruptcies exceeds (falls below) the upper (lower) bound of a normality range around the trend. Our general notion of firm excess mortality is inspired by the literature on human excess mortality, which currently receives wide attention due to the Corona pandemic.² However, as we will discuss, the conceptualization of excess mortality in this paper is not exactly the same as in the aforementioned literature.

We find that the Corona Crisis did not cause a wave of bankruptcies in Switzerland so far. A more detailed summary of our findings is provided in the conclusion of the paper.

¹See [KOF \(2020\)](#).

²See, e.g., [EuroMOMO \(2020\)](#).

Several media outlets and political players have been speculating whether or not a wave of bankruptcies will emerge in the upcoming months.³ However, empirical evidence on firm bankruptcies during and after the Corona Crisis is still scarce.⁴ Our paper contributes to the discussion in the following respects. First, we propose the concept of firm excess mortality in order to properly define what a wave of bankruptcies actually is and how it can be identified. Second, we present long time series data that allow to model and to identify excess mortality and undermortality over time at the regional, sectoral and Swiss-wide level. Third, by updating the analysis each month we help monitoring the development of firm bankruptcies in Switzerland in the future months.

Notably, just as other crises the Corona Crisis will likely affect the economy not only via how many firms exit the market, but also via how many firms enter newly. Accordingly, we complement our study by collecting all firm registrations in the Swiss Official Gazette of Commerce during the past years. We then construct monthly time series on the frequency of firm formations and identify periods of *excess formation* and *underformation* of firms at the regional, cantonal and sectoral level since the year 2006 and at the Swiss aggregate level since the year 2000.

The paper is structured as follows. Section 2 describes the data on firm bankruptcies and firm formations used in this study. Section 3 discusses how we construct time-series based measures for excess mortality, undermortality, excess formation and underformation of firms. Section 4 presents the results. Section 5 summarizes the findings and provides conclusions.

³See, e.g., NZZ am Sonntag, April 12, 2020, Tagesanzeiger, May 28, 2020, and Le Bilan, June 10, 2020. According to Heinz Karrer, the president of the Swiss corporate union Economiesuisse, in an interview with the Tagesanzeiger on May 29, 2020 a “a giant wave of bankruptcies is currently rolling towards Switzerland”.

⁴The *Neue Zürcher Zeitung* (2020) presented, for Switzerland and selected Swiss regions, a graphical comparison between the number of firm bankruptcies during January and May 2020 and during the same period of the year 2019. Buehler et al. (2012) study the geographic determinants of firm bankruptcies in Switzerland.

2 Data

The data used in this study comprise the firm bankruptcies and formations recorded in the Swiss Official Gazette of Commerce (SOGC). Since all legal bankruptcies and formations in Switzerland enter the SOGC, the dataset covers basically the total population of bankruptcies and new formations. Bisnode D&B collects these data at the micro level and pairs it with further firm-specific information such as the number of employees. For this study, we use monthly time series on the frequency of firm bankruptcies and new firm formations in the 26 Swiss cantons and in the different industries of the Swiss economy since the year 2006 and in overall Switzerland since the year 2000.

Regarding the bankruptcy data, three further points should be mentioned. First, in order to record a firm bankruptcy as early as possible, Bisnode D&B counts always the first announcement in the SOGC that indicates the bankruptcy of a firm. These announcements also include preliminary bankruptcy notices. These notices are sometimes revoked, which usually happens within the next few months after publication of the notice. As a consequence, the bankruptcy time series are subject to slight data revisions, as is the case with other macroeconomic time series too. For this study, we use the final data vintages. Second, the bankruptcy of a company is sometimes published in the SOGC with a certain time delay. About half of the bankruptcies are published within 7 days of the opening of the bankruptcy proceedings, the vast majority within the first 4 weeks. Third, the juridical reasons for bankruptcies have changed over time. For instance, in the 2008 reform of the Swiss Code of Obligations, organizational deficiencies of a firm were added as a possible reason for a bankruptcy filing. However, the structural breaks introduced by these law changes are minor from an aggregate perspective.

Regarding the firm formation data, the following further points are worth mentioning. Sole-trader companies (“Einzelunternehmen”) need to be registered in the SOGC only if the annual turnover exceeds CHF 100,000. As a consequence, some sole traders with small firms do not register at all, or they register only substantial time after the actual firm establishment when it turns out that the firm runs well. Second, a change in the legal form of a company is not counted as new company formation. Third, in some countries and sectors there exists

the practice to periodically liquidate and found firms anew in order to, e.g., get rid of outstanding debts. In Switzerland, such behavior amounts to single cases and, hence, does not affect the aggregate statistics.

3 Modelling Excess Mortality of Firms

We adjust the series for monthly seasonality using the seasonal-trend decomposition (STL) based on locally estimated scatterplot smoothing (LOESS) (Cleveland et al., 1990). As most series are non-stationary, we estimate multiplicative seasonal factors by taking logs of bankruptcies and formations. We prefer STL-LOESS to X13-ARIMA-SEATS or related benchmark methods, since the latter are less stable when applied to series with small numbers such as the bankruptcy frequency series for small cantons.

Next, we extract the trend from the series using the Hodrick-Prescott (HP) Filter with a smoothing parameter value $\lambda = 129600$ as has been suggested by Ravn and Uhlig (2002) for monthly series.⁵ Admittedly, the trend of a series heavily depends on which trend extraction method is actually applied. We chose the HP Filter simply because it still seems to be a widely used standard in macroeconomics.⁶

Further, we calculate a probability range around the trend in which the frequency of firm bankruptcies/formations lies with a certain probability (e.g., 90%). This calculation relies on two alternative assumptions. The first assumption is that the cantonal, sectoral and aggregate frequencies of the firm bankruptcies and formations are distributed according to a Poisson distribution, where the rate parameter λ varies over time and is equal to the respective trend value extracted from the HP Filter at each point in time. Alternatively, we assume that the frequencies are distributed according to a log-normal distribution, where the time-varying mean parameter μ is equal to the respective trend value. We generate probability ranges from both distributions. When the frequency series values are low (high), the ranges obtained from the Pois-

⁵We again logarithmize non-stationary series to account for larger variations in the cyclical pattern as the level increases.

⁶See, however, Hamilton (2018), e.g., for a critic of the HP Filter. We also experimented with other filter and moving average methods for means of robustness.

son distribution tend to be broader (narrower) than those obtained from the log-normal distribution. Hence, to be conservative, we calculate the final range by always choosing the higher of the alternative upper values and the lower of two alternative lower values.

We refer to the difference between the (seasonally adjusted) number of bankruptcies and the trend value of bankruptcies as the *excess mortality of firms*. Note that, according to this definition, excess mortality can also be negative (namely when the seasonally adjusted number of bankruptcies is lower than the trend). Negative excess mortality may also be called undermortality. The terms excess formation and underformation of firms are defined in the same way.

The probability ranges may be interpreted as the “normal range” of firm bankruptcies/formations. If the frequency of bankruptcies in a period exceeds the upper bound of the range, we call this a situation of *significant excess mortality of firms*. For instance, if the number of bankruptcies is above the range in which the bankruptcy variable lies with a probability of 90%, there exists significant excess mortality at the 90% level of significance. In contrast, a situation where the frequency of bankruptcies falls below the lower bound of the range is referred to as significant undermortality of firms.

The use of the aforementioned terms is inspired by the literature on human excess mortality.⁷ However, there are differences as the latter literature deals with data on humans and conforms to the standards of empirical research in clinical biology, whereas we deal with firm data and conform to the standards of empirical macroeconomics. First, the human excess mortality literature controls for temperature and possibly other factors affecting human mortality, whereas we seasonally adjust the data according to a standard procedure used in macroeconomics. Second, the aforementioned literature employs simple or sophisticated versions of the Poisson distribution in order to calculate normality ranges, while we opted for the mix of Poisson distribution and log-normal distribution described above. Third, the aforementioned literature defines the human excess mortality in any given period as the actual (or the controlled) mortality minus the expected number of deaths under normal conditions, where this expected number is either the average over past periods or is modeled with

⁷See, e.g., [Checchi and Roberts \(2005\)](#), [Nielsen et al. \(2018\)](#) and [Nielsen et al. \(2019\)](#).

more sophisticated time series models. In contrast, we define the excess mortality of firms as the (seasonally adjusted) number of bankruptcies minus the trend value extracted from the bankruptcy time series.

4 Results

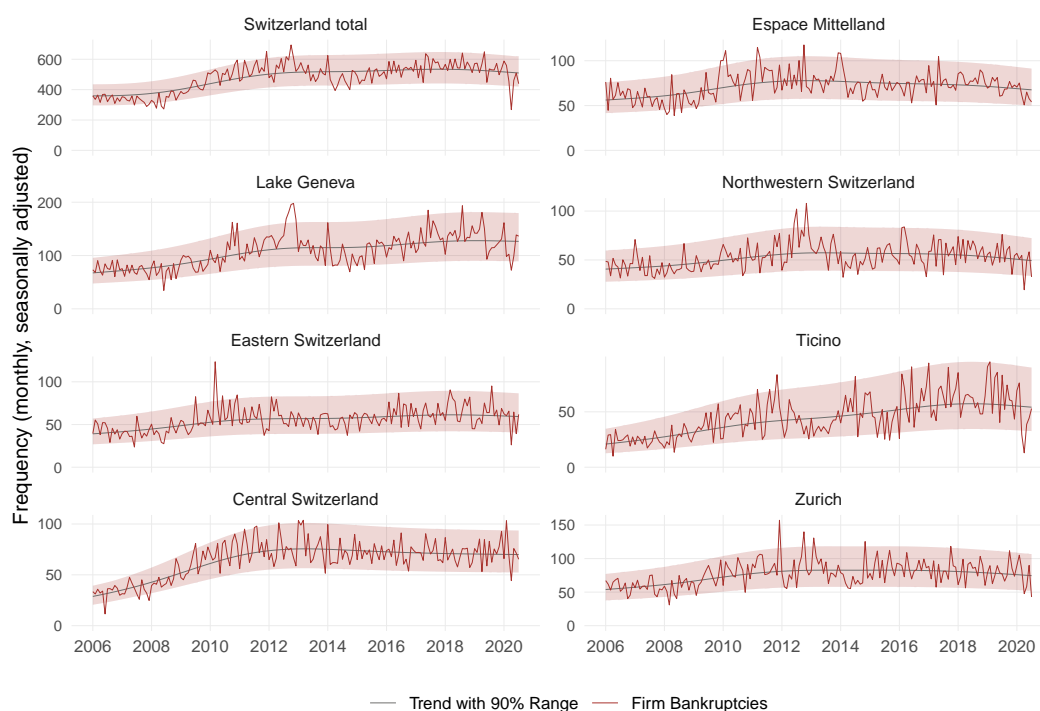
Figure 1 shows the frequency of corporate bankruptcies in Switzerland as a whole and in the Swiss Greater Regions over time since the year 2006.⁸ The legal freeze ordered by the Federal Council (19 March to 4 April 2020) and the subsequent suspension of debt collection (until 19 April) resulted in a historically unprecedented slump in the number of bankruptcies in April. Between March and July 2020, bankruptcies were on average 21% lower than in the same period of the previous year. The slump was felt in all major regions, although to varying degrees. While bankruptcies were almost 50% lower in Ticino, they were only 10% lower in Central Switzerland. In June, the number of bankruptcies at the national level was slightly above trend and in July it was below trend again. At the cantonal level, only in the canton of Valais was the bankruptcy frequency well above trend in the past two months, although there was no significant excess mortality. In sum, there are currently no signs of a wave of bankruptcies in Switzerland.

One reason for the currently low number of company bankruptcies might be the COVID-19 credit program of the Swiss Confederation. Under this program, from 26 March to 31 July 2020, companies were able to obtain loans secured in whole or in part by the Confederation from private banks at favourable conditions within a short period of time. The purpose of the loans is to cover the companies' running costs.⁹

⁸Appendix 6.1 presents the corporate bankruptcies in Switzerland since the year 2000. The figures on new firm formations in Switzerland, in the Swiss Greater Regions and in the different sectors of the Swiss economy are shown in Appendix 6.2. Further, Appendix 6.3 contains the time series figures on the frequency of firm bankruptcies and new formations at the cantonal level.

⁹100% guarantee and interest rate at 0% up to a maximum of CHF 500,000 or 10% of annual turnover. 85% guarantee and interest rate of 0.5% per annum on the guaranteed portion of the loan from CHF 500,000 up to a maximum of CHF 20 million or 10% of annual turnover. Term of 5 years or 7 years in cases of hardship. See <https://covid19.easygov.swiss>.

Figure 1: Frequency of Firm Bankruptcies in Switzerland and its Regions



How are the bankruptcy figures developing in the various sectors of the Swiss economy? Figure 2 shows the number of corporate bankruptcies over time in various sectors of the economy, grouping together several small sectors. To date, no sector has shown a trend towards significant excess mortality; a significant undermortality has been recorded much more frequently. In the transport and communications sector, bankruptcies between March and July were on average 43% lower than in the same period of the previous year, while in the construction sector they were still 32% lower. By contrast, the Corona Crisis was barely noticeable in agriculture and mining. In the wholesale and retail sectors, bankruptcies jumped up in May and June, but still did not make up for the sharp slump in April. Further, the July figure was again close to the trend, so that bankruptcies were still 7% lower than in the same period of the previous year. One argument against a sharp increase in bankruptcies in the coming months in the wholesale and retail sectors is that sales have returned to normal after the lockdown (see the indicators presented in Eckert and Mikosch, 2020). However, the situation will likely be different if Switzerland experiences a strong second wave of infections. There are also no worrying developments so far in the hospitality industry (restaurants, hotels, etc.) or in the leisure

and entertainment industry, which were hit particularly hard by the slump in sales during the Corona Crisis.

Figure 2: Frequency of Firm Bankruptcies in the Sectors of the Swiss Economy

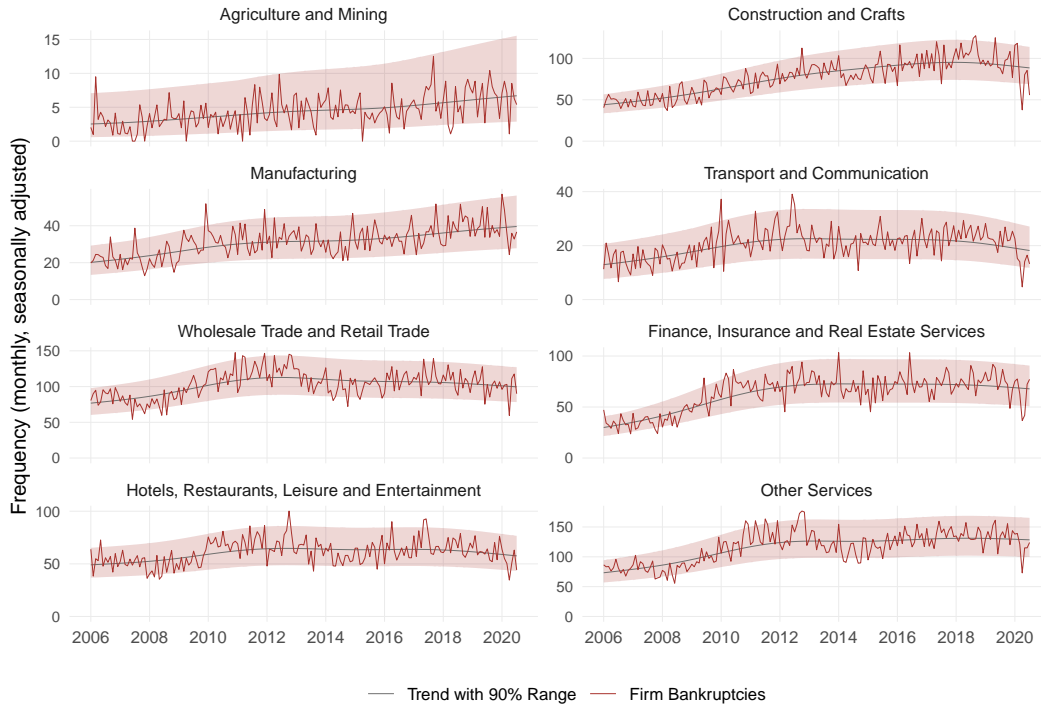


Figure 3 shows the excess mortality in Switzerland for the period before and after the start of the Corona Crisis compared with the crisis periods during the Great Recession and the Swiss franc shock. The start (= month 1) of the respective crisis period is always at the beginning of the quarter in which Switzerland's gross domestic product was negative.

During the Great Recession, excess mortality increased significantly. The difference between the mean values (indicated by the blue dotted lines) up to month 0 and from month 1 onwards is statistically highly significant. After the Swiss franc shock, excess mortality also increased, but not to a statistically significant extent. As the figure also shows, excess mortality on average over the 18 months before the Corona Crisis was significantly higher than on average over the 18 months before the Great Recession or before the Swiss franc shock. However, after the outbreak of the Corona Crisis, excess mortality did not rise further, but fell sharply on average, resulting in a significant

undermortality. This is also the case if one excludes the slumps in March and April caused by the legal freeze and the debt collection holidays.¹⁰ Against this background, a noticeable increase in corporate bankruptcies this year and next would be in line with past crisis experiences. The figure also shows that corporate bankruptcies did not rise abruptly in the wake of the Great Recession or the Swiss franc shock, but only gradually over time. The widespread expectation of a sudden wave of bankruptcies following the Corona Crisis is therefore not covered by past crisis experience.

Figure 3: Comparison of Bankruptcies Before and After Crisis Periods



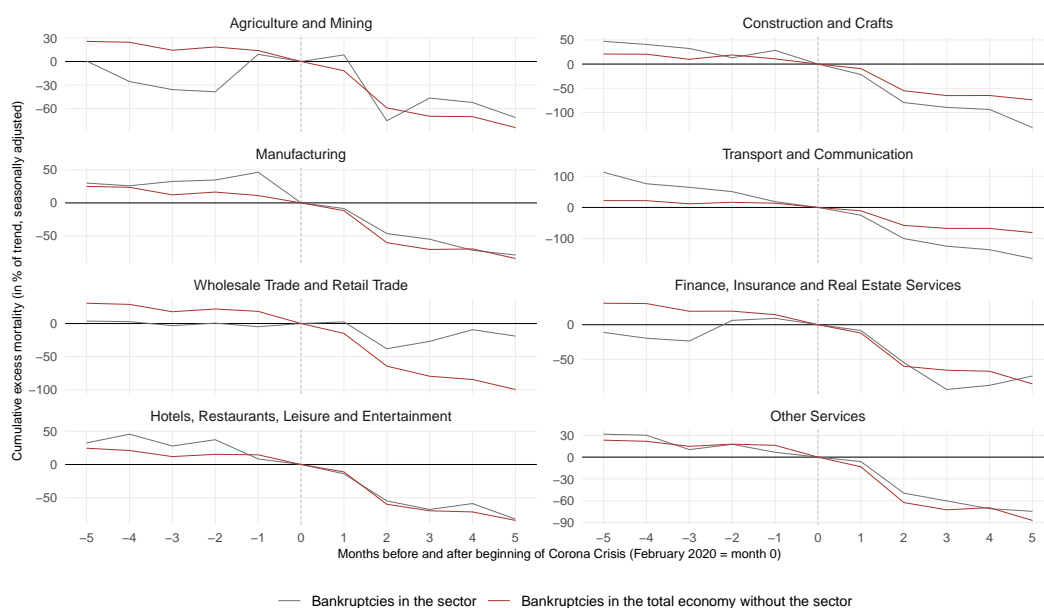
Although no economic sector tends currently towards significant excess mortality, the Corona Crisis has an uneven impact on the bankruptcy dynamics in the individual sectors, as can be seen from the analysis of cumulative excess bankruptcy frequencies. If the bankruptcies are above trend over several months, this drives the cumulative excess mortality upwards even if the (non-cumulative) excess mortality is never significant during this period. Thus,

¹⁰The patterns described for the Great Recession and the Swiss franc shock, as well as the comparison between the above-mentioned crises and the Corona Crisis are not only evident at the national level, but are also prevalent in the major regions and economic sectors of Switzerland.

cumulative bankruptcy figures are a complementary assessment criterion in addition to excess mortality.

As can be seen from Figure 4, the cumulative excess mortality in the wholesale and retail trade industries was below that of the Swiss economy as a whole (excluding wholesale and retail trade) in the months prior to the outbreak of the Corona Crisis, but it has been significantly higher since the beginning of the crisis.¹¹ This is an indication that the Corona Crisis has so far had a much stronger impact on the incidence of bankruptcies in wholesale and retail trade than in the rest of the Swiss economy. Interestingly, the hospitality and leisure/entertainment industries have not been affected to a greater extent than the rest of the Swiss economy. This might also be due to the fact that companies in these industries frequently made use of the credit program.

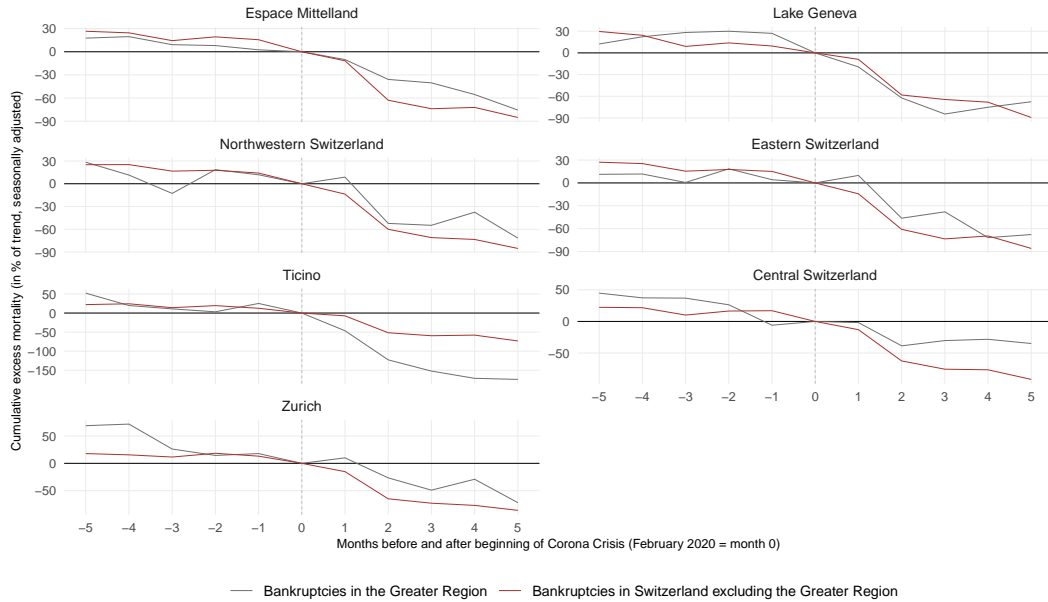
Figure 4: Cumulative Excess Mortality in Different Industries



¹¹Cumulative excess mortality can also decrease or be negative, namely when the seasonally adjusted number of bankruptcies is lower than the trend. For the construction of the figure, we first index the number of bankruptcies to zero for the month before the outbreak of the Corona Crisis in Switzerland (= February 2020). For all other months, we calculate the excess mortality (= difference between the seasonally adjusted number of bankruptcies and the trend value) and accumulate it forward from March and backward from January. For example, the cumulative excess mortality for month 5 (= July 2020) or for month -5 (= September 2019) is the sum of excess mortality numbers for the months March to July 2020 or for the months September 2019 to January 2020.

Figure 5 shows cumulative excess mortality numbers separately for each Greater Region, as compared to cumulative excess mortalities in Switzerland (excluding the respective region). The cumulative excess mortalities in this figure are constructed in the same manner as in Figure 4. As of July 2020, the canton of Ticino saw fewer cumulative bankruptcies than the Swiss economy (without Ticino). Central Switzerland, on the other hand, experienced comparatively more cumulative bankruptcies so far. Most other regions saw a trajectories similar to the one at the national level.

Figure 5: Cumulative Excess Mortality in the Swiss Greater Regions



Appendix 6.4 presents, at the regional level and at the sectoral level, the cumulative excess mortalities before and after the start of the Corona Crisis compared with the Great Recession during 2008, the euro crisis during 2011 and the Swiss franc shock during 2015.

5 Conclusion

This paper analyzes the frequency of firm bankruptcies and new firm formations in Switzerland in order to monitor the economic impact of the COVID-19 pandemic. We use time series in monthly frequency on corporate bankruptcies and firm formations at the regional and the sectoral level. In order to extract

the information of interest, each time series is seasonally adjusted and decomposed into trend and cycle components. We then calculate probability ranges around the trend to determine time periods of significant excess mortality or undermortality of firms.

The preceding analysis produces the following interim conclusions (data as of July 2020): The legal freeze ordered by the Federal Council (19 March to 4 April 2020) and the subsequent suspension of debt collection (until 19 April) resulted in a historically unprecedented slump in the number of bankruptcies in April. A strong rebound has not been happening so far. Between March and July 2020, the number of bankruptcies in Switzerland was on average 21% lower than in the same period last year. In none of Switzerland's major regions or economic sectors has the number of company bankruptcies in recent months been strongly above trend. At the cantonal level, only the canton of Valais recorded a bankruptcy frequency that was well above trend in the past two months, although there was no significant excess mortality. A comparison between economic sectors indicates that the Corona Crisis has had a stronger effect on the bankruptcy frequency in the wholesale and retail trade industries than in the rest of the Swiss economy. By contrast, the hotel and restaurant industry and the entertainment industry have so far been surprisingly little affected, either in absolute or relative terms, compared with other economic sectors.

One reason for the overall low level of bankruptcies is likely to be the federal government's COVID-19 credit program, which gave smaller companies easy and cheap access to (bridging) loans. However, there is still no reason to give the all-clear. One reason for this is that at least some bankruptcies were probably only postponed by the program. Further, past economic crises did not induce a sudden but a gradual increase in the frequency of bankruptcies.

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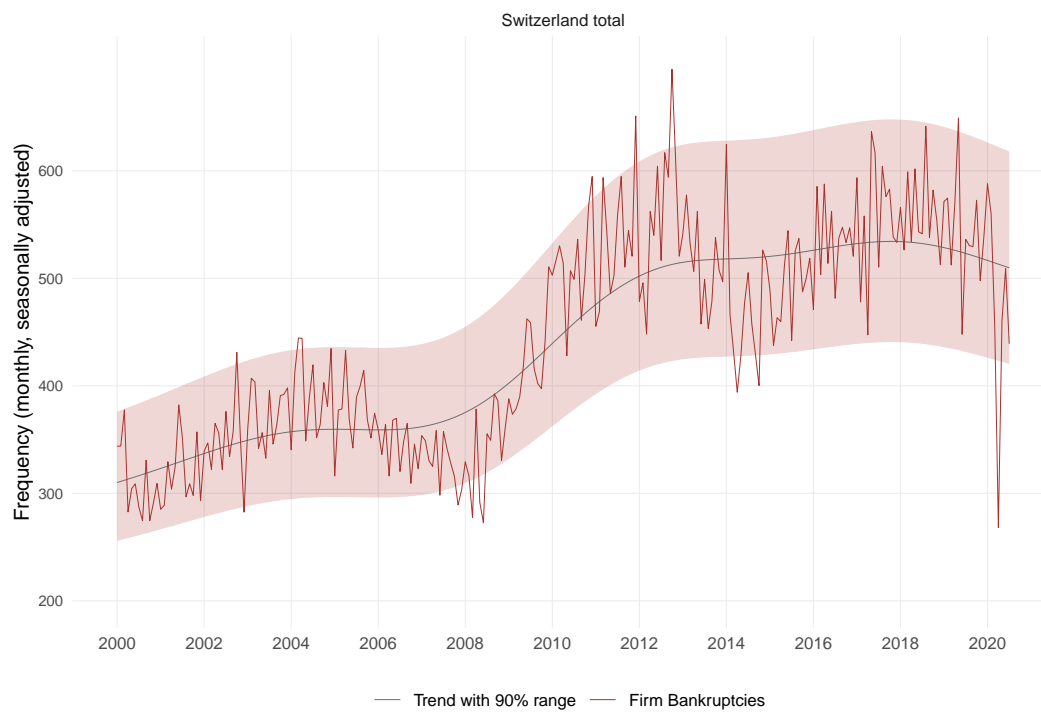
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6 Appendix

6.1 Firm Bankruptcies since 2000

Figure 6: Frequency of Firm Bankruptcies in Switzerland Since the Year 2000



6.2 New Firm Formations

Figure 7: Frequency of New Firm Formations in Switzerland

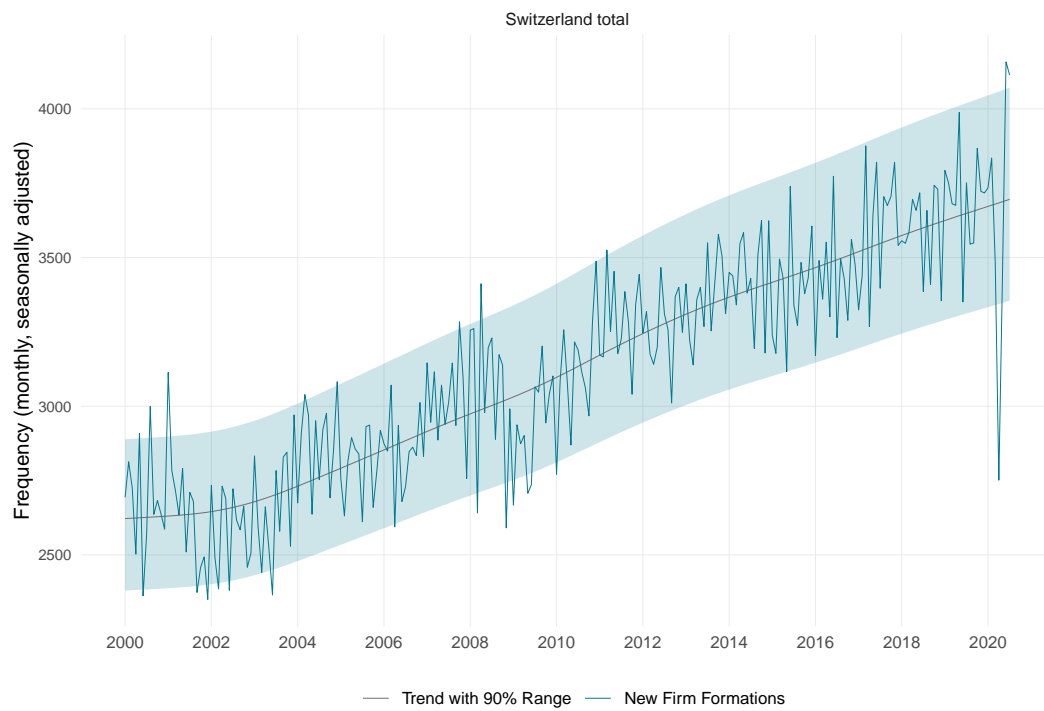


Figure 8: Frequency of New Firm Formations in the Swiss Greater Regions

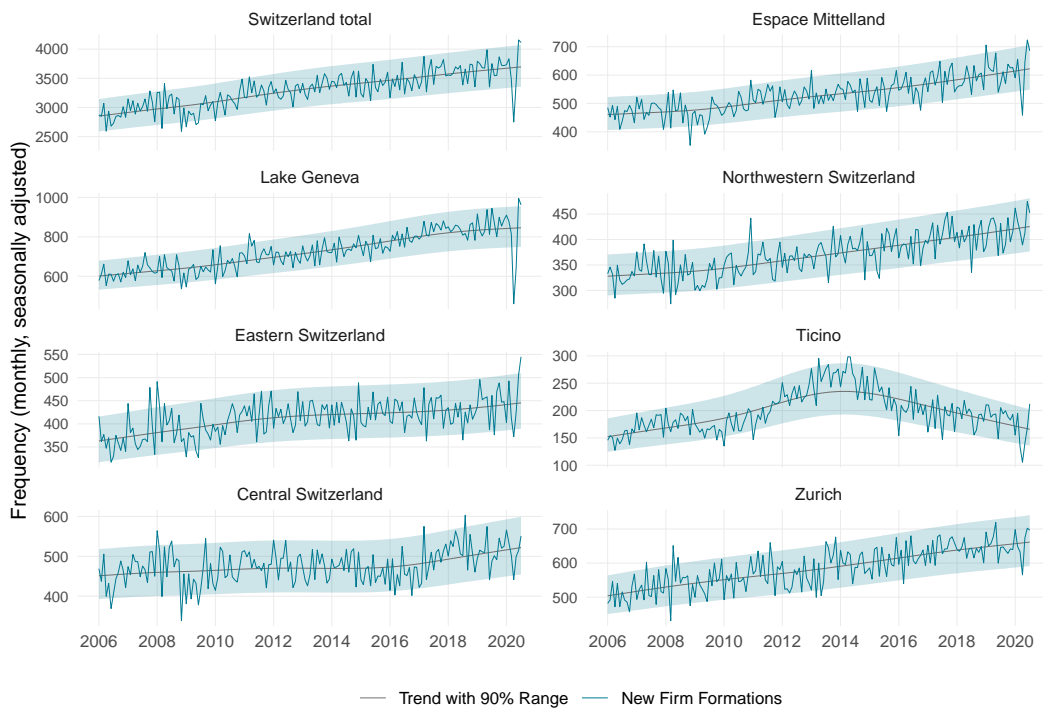
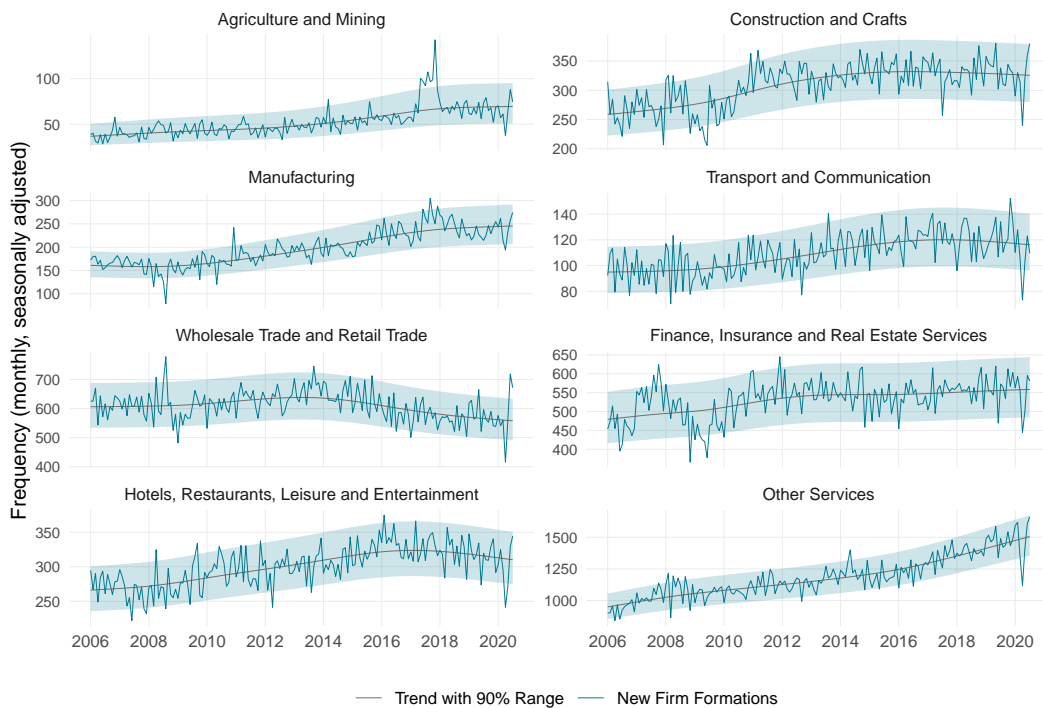


Figure 9: Frequency of New Firm Formations at the Sectoral Level



6.3 Bankruptcies and Formations at the Cantonal Level

Figure 10: Frequency of Firm Bankruptcies at the Cantonal Level

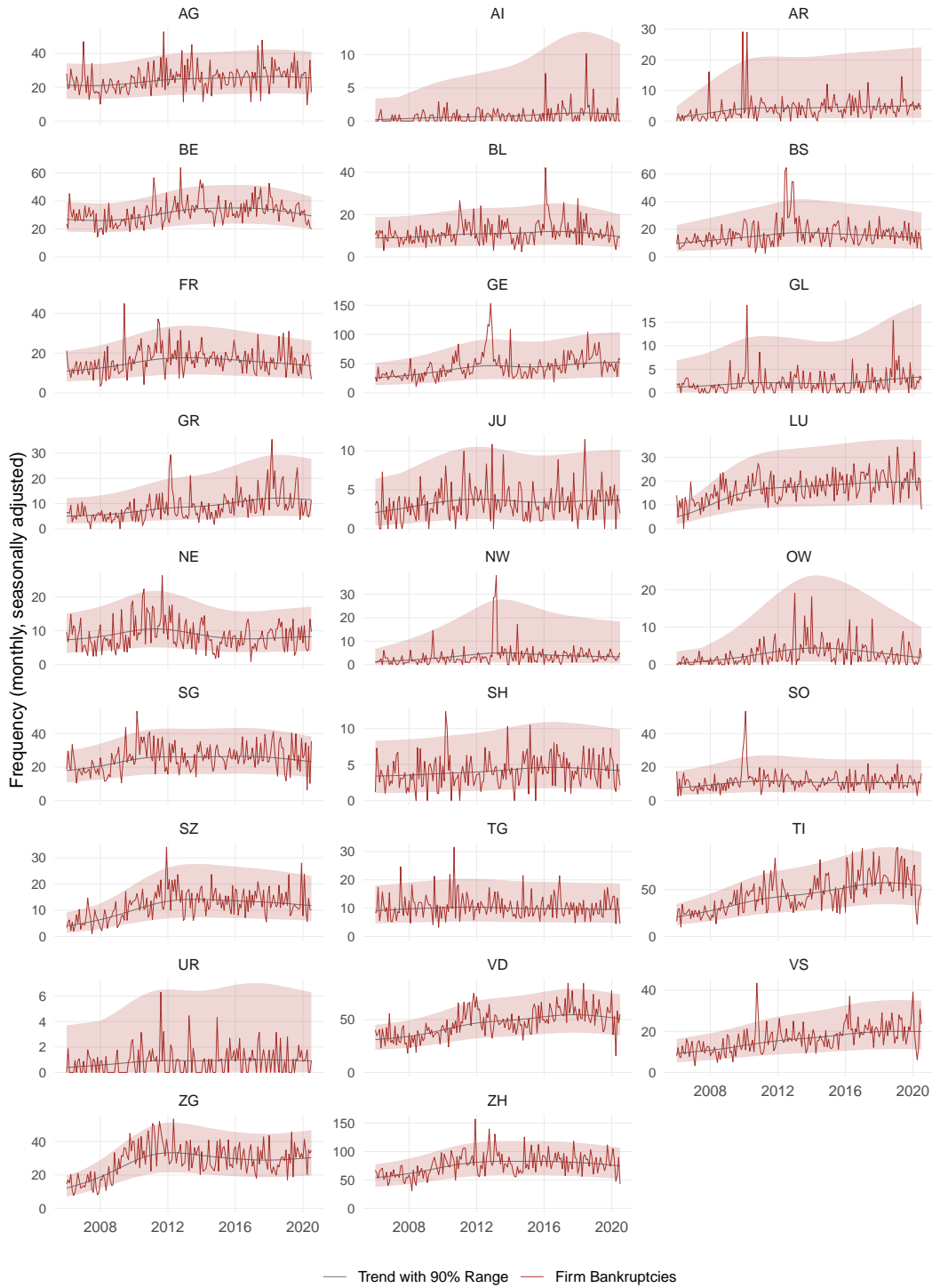
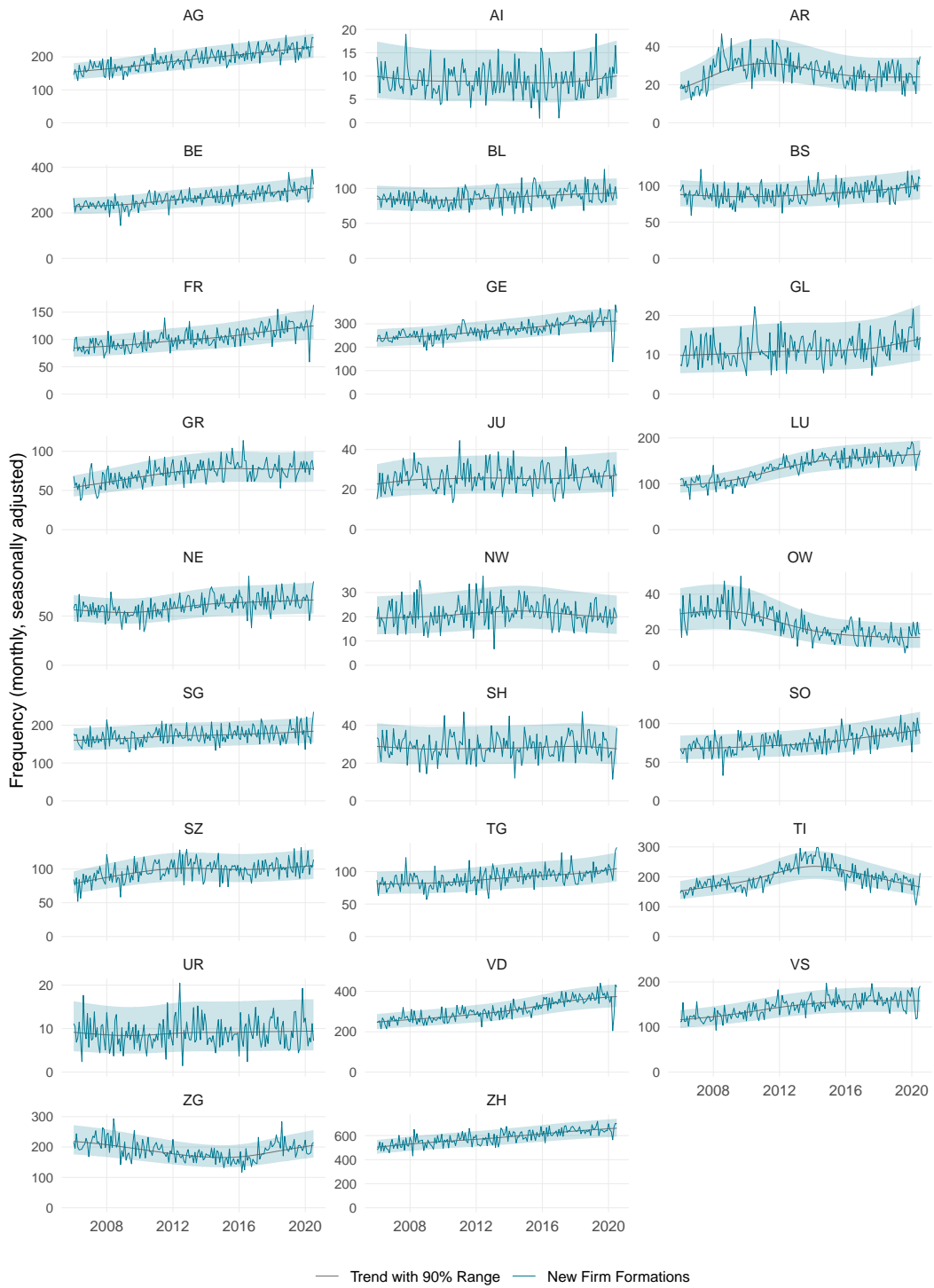


Figure 11: Frequency of New Firm Formations at the Cantonal Level



6.4 Cumulative Excess Mortalities During Crises

Figures 12 and 13 shows the cumulative excess mortalities before and after the start of the Corona Crisis (February 2020 = Month 0), compared with various phases of weakness in the Swiss economy caused by the Great Recession (June 2008 = Month 0), the euro crisis (June 2011 = Month 0) and the Swiss franc shock (December 2014 = Month 0). For the construction of the figure, we first index the number of bankruptcies to zero for the month before the outbreak of the respective crisis. For all other months, we calculate the excess mortality (= difference between the seasonally adjusted number of bankruptcies and the trend value) and accumulate it forward from month 1 and backward from month -1 . To give an example, for the Corona Crisis, the cumulative excess mortality for month 5 (= July 2020) or for month -5 (= September 2019) is the sum of excess mortality numbers for the months March to July 2020 or for the months September 2019 to January 2020.

Figure 12: Cumulative Excess Mortality in Switzerland and its Regions

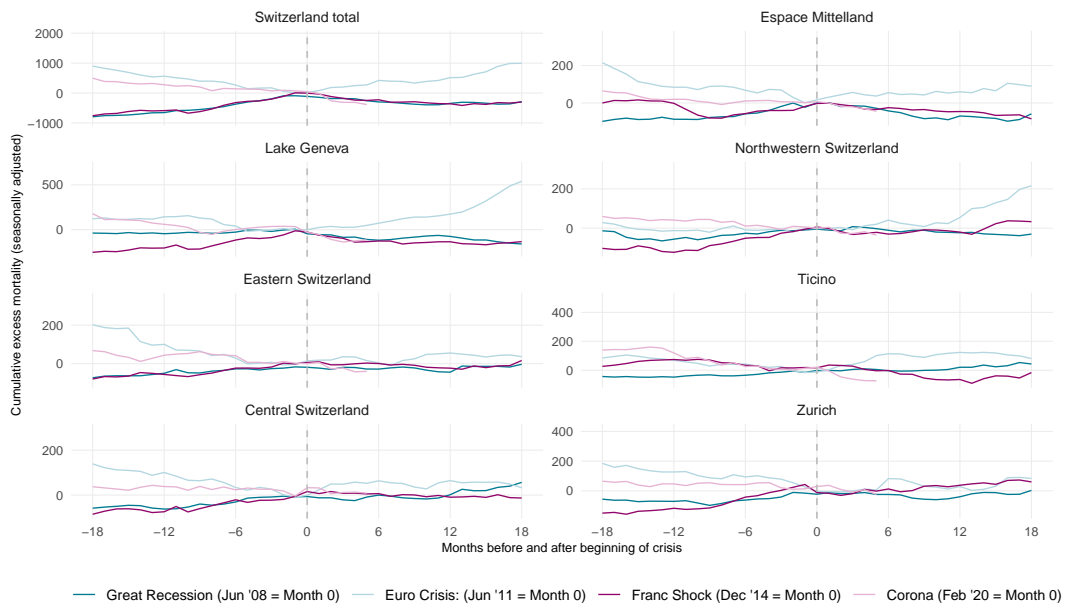


Figure 13: Cumulative Excess Mortality in the Sectors of the Swiss Economy Industries

