

The impact of COVID-19 on the foundation and dissolution of charitable organisations

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Abstract

Stakeholder and media reports have presented COVID-19, and its associated economic and social effects, as offering an existential threat to many charitable organisations. As yet, however, there is limited detailed evidence of the effect on the pandemic on organisational events such as the rates of opening and closure of charities. Using comprehensive publicly available data from charity regulators, we examine the impact of COVID-19 on the foundation and dissolution of charitable organisations. We employ an “excess events” analytical approach, comparing the numbers of foundations and dissolutions in 2020 to what we would expect based on the trends from previous years. We reflect on the differential impact of COVID-19 across UK nations.

Introduction

The onset of the COVID-19 pandemic in early 2020, and the associated lockdown of economy and society, prompted the vociferous expression of concerns about an existential threat to many charitable organisations. Some of the headline figures focused on the enormous losses of income likely to be visited upon major charities, some of which were fixtures in the public’s perception of the charitable landscape. Several of these depended on sales of goods and services, as is evident from their strong presence in the retail landscape, but this visibility was also a source of vulnerability, since activities such as trading through charity shops were not going to be feasible under lockdown restrictions.

Aside from the risks faced by prominent individual organisations there was a sense from initial surveys of a potential threat to very large numbers of organisations. At times, the evidence verged on the apocalyptic. A survey in early April 2020 from the Directory Of Social Change asserted that over half of their 300 respondents would “go bust within 6 months” without additional financial support and over 70% of organisations anticipated that they would do so by the end of 2020. (Directory of Social Change, evidence to DCMS enquiry).

A key national grantmaker had conducted a survey of its recipients, claiming that nearly 2/5 of respondents would be unable survive for a longer than 6 months; one-tenth anticipated that they would survive no longer than 10 weeks. Media coverage and evidence given to public enquiries highlighted dramatic examples of individual organisations, either facing closure within a matter of weeks, or contemplating the almost total loss of key income streams and therefore operating on a substantially reduced basis at a time when demands for their services was increasing substantially. The position of small- and medium-sized organisations, often exemplified as the beating heart of the voluntary sector and on the frontline of immediate responses to emerging needs, featured strongly. In this paper we provide a comprehensive analysis of emerging evidence (as of June 2021) on the pandemic’s impact on the foundation and dissolution of charities in the UK. In particular we focus on a) whether the long-run level and trend in dissolutions has been altered by the pandemic; and b) whether the impact has been felt equally across the sector e.g., are certain types of organisations now more likely to dissolve compared to previous years? We conclude by comparing the patterns observed in the UK to other charity jurisdictions.

About this project

Our research is being funded by the Economic and Social Research Council as part of the UK Research and Innovation call for studies that can contribute to understanding and alleviating the social impact of the pandemic. The project will provide an analysis of the variegated impacts on charities of the very severe financial constraints they will experience due to the immediate and longer-term economic effects of the Covid-19 crisis. Building on our extensive prior research on the finances, distribution and exposure to risk of charities we will utilise large-scale databases constructed since 2008 to assess the distribution of financial vulnerability across the population of charities. The project is a collaboration between the universities of Birmingham, Southampton and Stirling, and the National Council for Voluntary Organisations (NCVO).



Context

Voluntary organisations such as charities play an important role in the welfare mix in the UK and in recent years a series of independent enquiries have reasserted the significance of this contribution, arguing, for example, that these organisations are “never more needed”. In order to respond to such expectations organisations require a degree of permanence and predictability, but the paradox is that while their social contribution is celebrated, the resource base of organisations is not

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guaranteed. There has been an underlying stability, though not substantial growth, in donations from individuals; government funding, both in absolute and percentage terms, rose somewhat during the years of new Labour government, but has fallen back subsequently; there has been a steady growth in income from charitable bequests, albeit one that is heavily concentrated in small numbers of organisations, and one which provides relatively small proportions of the resource base; for those charities with assets (whether endowments of financial assets, property) returns have dropped in recent times, especially from financial assets. Key sources of income have been the growth of sales of goods and services, such as the substantial trading activities of organisations. Reflecting this complex funding mix, there are debates about the identity of the voluntary sector and “hybrid” character of organisations, positioned as they are between the state, the market and the community. There is considerable variation, at the level of individual organisations, in the extent to which they are able to draw upon particular sources of income.

It follows that the risk to an organisation of the cessation of economic and social activities associated with an event such as COVID-19 depends on the exposure of that organisation to specific funding streams. In the case of entities that possess substantial endowments, on which they draw to provide the bulk of the income that supports their activities, risks are associated with the performance of their assets. In the case of organisations that rely almost entirely on fundraising events held during the summer, on the other hand, severe restrictions on social activities could in principle eliminate almost all of their income. Organisations delivering services under contract might still be in a position to receive revenues (e.g. from government) but be unable to deliver services (because of social distancing restrictions). Whether organisations cease to exist as a consequence depends among other things on the severity of these shocks, the financial reserves that they hold, and their ability to continue in existence on an entirely voluntary basis. As observed in North American scholarship, “birth” and “death” notices are rarely published in the voluntary sector and the causes of the demise of individual organisations are difficult to trace. But an essential preliminary to an understanding of the effects of the pandemic is to obtain a sense of aggregate trends.

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Impact of COVID-19 on charitable activity

A number of rapid response projects have been initiated to try and capture the real-time impact of the pandemic on the UK charity sector. Headline figures from various surveys which aim to capture the impact of the pandemic present a broadly consistent picture in which, typically, a small and unrepresentative sample of organisations tells us that the financial position has deteriorated within a given reference period, that they anticipate COVID-19 to have a clear negative impact on delivering their objectives, and that they believe there to be an enhanced likelihood that their organisation would cease to operate at some point in the near future.

To give one example, the 'Respond, recover, reset: the voluntary sector and COVID-19' project uses surveys to produce regular snapshots of the UK voluntary sector (charities, social enterprises, mutual aid associations etc). With between 380 and 700 respondents, the survey has been monitoring the position of voluntary organisations since September 2020. It contains several indicators which are repeated monthly (individual reports also focus on particular topics). For example, when asked whether they believe their organisation is unlikely or very unlikely to be operating next year, between 8 and 14% have agreed. This compares with a typical dissolution rate for registered charities of no more than 2-3%.

“Headline figures from various surveys present a broadly consistent picture in which they anticipate COVID-19 to have a clear negative impact on delivering their objectives.”

Six survey waves have been conducted so far and findings suggest that short-term expectations are improving with respect to voluntary organisations' financial positions. The survey has reported a downward trend in the proportion of organisations stating that COVID-19 is having a moderate negative impact or a significant negative impact on delivering their objectives. Here, the proportion has dropped from 80% to just under 70%. As to the deteriorating financial position of the sector, respondent organisations are asked whether their financial position has got worse or has got better during the past month. Typically this is showing a negative balance of between a fifth and a sixth of organisations: in other words, rather more organisations believe the situation is getting worse than believe it is improving. In January 2021, the proportion of organisations believing things got worse almost balanced those believing things have improved, before

reverting to a negative balance of 21 percentagepoints in February. The picture being presented is one of expected deteriorations in financial resources and consistent assumptions that there will be increased demand for services. If this is correct, one would anticipate a growing number of organisations experiencing a heightened risk of financial vulnerability and therefore an increase in the dissolution rate.

There are issues with the representativeness of these surveys (for example, large organisations, and organisations that employ staff, are consistently overrepresented, and as far as can be judged in published work, no adjustments are made). There may be also questions about the validity and reliability of what such surveys are measuring. A statement about whether the financial position of an organisation has got worse or better in the past month might be thought unproblematic, but a situation in which an organisation has also received no income in several successive months (e.g. because of lockdown) is likely to be thought objectively bad on any measure, yet a truthful answer to that question would be that the situation had not changed. In the same vein, statements about 'negative impacts on the delivery of charitable objectives' imply there is a consistent understanding of what a negative impact is across organisations.

The advantage of these surveys is timeliness, and it has always been a criticism of reliance on data from regulators that there is a substantial time delay. However, the trade-off is that by using surveys we capture perceptions of what might happen rather than reports of what is actually happening.

On the other hand, the validity and reliability of regulatory data means that it may be worth waiting for. And some events such as removal from registers leave no room for argument. In this paper we demonstrate the utility of the use of information from the Charity Commission for England and Wales (CCEW), Scottish Charity Regulator (OSCR) and from Companies House to track the registration of charities, and charitable companies, respectively. We test to what degree these pessimistic prognostications and indications have come to pass by drawing on high quality administrative data from UK and international charity regulators.

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Data

Data for this study come from the publicly available registers of eight regulatory agencies: in England and Wales (CCEW), Scotland (OSCR), Northern Ireland (Charity Commission for Northern Ireland), Australia (Australian Charities and Not-for-profits Commission), New Zealand (Charities Services), Canada (Canada Revenue Agency), and United States of America (Internal Revenue Services); in addition we draw on the register of UK companies provided by Companies House. The data underpinning this analysis were collected on 2021-05-28 using a Python web scraping script that has been running on the 28th of each month since August 2020.

The charity registers are censuses of non-profit organisations that a) possess charity status and b) are registered with the relevant regulator. For some jurisdictions the register contains all organisations granted charity status (e.g., Scotland, New Zealand), while in others there are charitable organisations that operate outwith the oversight of the charity regulator (e.g., England and Wales, Northern Ireland). In most jurisdictions the regulator has a legal mandate to create, maintain and publish a charity register, thus we can be confident that these records are of sufficient quality for use in scholarly research (McDonnell and Rutherford, 2022).

“The charity registers are censuses of non-profit organisations that a) possess charity status and b) are registered with the relevant regulator. “

In order to provide a richer description of the types of organisations dissolving, we link regulatory data for England and Wales charities to a base dataset that has been collected and maintained by TSRC, initially bringing together various electronic copies of charity financial returns supplied to NCVO from the late 1990s, and adding to these subsequent financial records from the Charity Commission. The base dataset used here also contains records that are not available in the public data extract, and provides additional important covariates, supplied by the NCVO research team, such as International classification of nonprofit organisations (ICNPO) field of activity and geographic identifiers (e.g. local government units) and socio-economic data (such as deprivation indicators).



For charities in Scotland, England & Wales, we also examine the insolvency reports made to Companies House by charitable companies – entities which take the legal form of a Company Limited by Guarantee. This is a subset of the charitable sector, and tends to be larger charities because company status is more likely to be taken out by organisations which are engaging in trading and contracts, and/or managing significant property assets and employing staff. While much rarer than de-registration, this duty to report when a company is insolvent means that reports are made in a more timely fashion and so this sub-sample provides us with a measure of charities in financial distress prior to their completing the de-registration process with the relevant charity regulator. Data from Companies House is extracted through the Companies House API using the company number attached to the charity’s record.



Method

The main phenomenon of interest is the impact the COVID-19 pandemic had upon foundation and dissolution rates of charitable organisations. Here we define ‘foundation’ as the registration of a charity with the respective regulator; and ‘dissolution’ as the de-registration of a charity with the respective regulator.ⁱ Thus a foundation is a subset of all new charitable organisations established in a given year, and a dissolution is a general term for the wide variety of ways in which a charity can cease to exist (e.g., it can merge with another organisation, revoke its charity status but continue operating, change legal form, become insolvent and wind up).

The pandemic is a once-in-a-century event and thus posited to alter the expected or ‘normal’ levels of foundations and dissolutions. To measure this impact, we draw upon the analytical approach for calculating the level of “excess deaths” resulting from COVID-19 (see ONS, YEAR; Healy, 2020). Applied to this study, the impact of the COVID-19 pandemic can be measured as the number of excess foundations and dissolutions observed in each jurisdiction.ⁱⁱ We do this using the following steps:

1. Measure observed numbers of registrations and de-registrations in 2020, annually and monthly.
2. Calculate average (mean) numbers of registrations and de-registrations for the period (2015-2019), annually and monthly.
3. Calculate different between observed and average (expected) numbers of registrations and de-registrations for 2020, annually and monthly (see appendix A for a worked example of this approach).

A limitation of this method is that it does not take account of temporal trends in registrations and de-registrations. For example, the number of dissolutions in a country may be decreasing over time, and thus a further drop in 2020 may have been expected regardless of COVID-19. To account for any temporal trends present in the data, we estimate expected numbers of registrations and de-registrations using interrupted time series analysis (ITSA) – see appendix B for details of this analytical method. The ITSA model is estimated using data relating to periods before the pandemic (pre-April 2020), and the predictions from the model used to forecast what would have happened in 2020/2021 if the pandemic hadn’t occurred. We then compare the prediction to what we observed for 2020/2021 to see if the pandemic has shifted the level and/or trend in foundations and dissolutions.

Results

Dissolutions

Figure 1a presents the dissolution rate for charities in England and Wales since 2000: for example, the rate in 2015 captures the 3% of charities that filed a non-zero income 2014 annual return to the Charity Commission for England and Wales (CCEW) that were removed from the Register in 2015. With the notable exceptions of 2000 and

2009 (the latter the financial crisis’ impact), the dissolution rate has remained steady over time. The rate for 2020 is slightly lower than average and compared to the previous year. Reliable data for Scotland only goes back to 2013 but the largely stable trend is similar to England and Wales (**figure 1b**).

Figure 1a Dissolution rate England & Wales

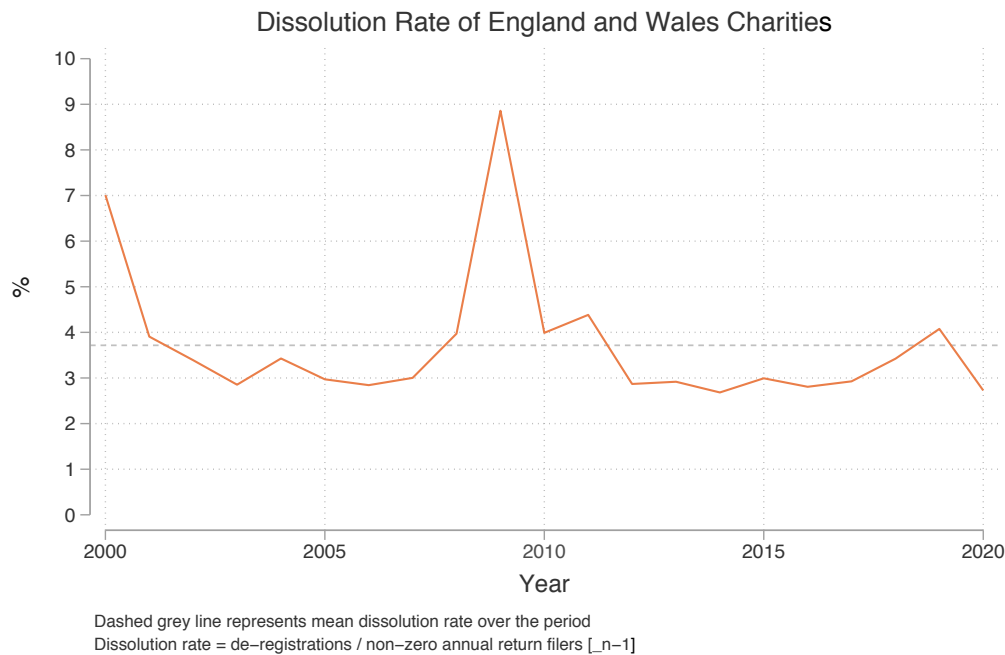
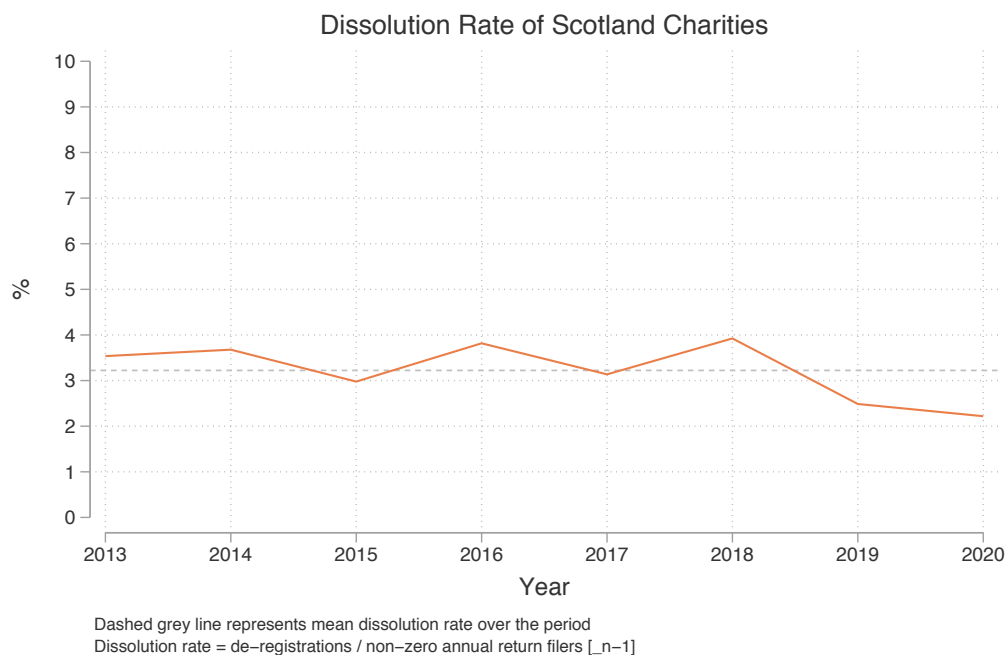


Figure1b Dissolution rate Scotland



The proportion of E&W charities filing zero-income returns is rising over time (**figure 2a** below), though the rate for 2020 is provisional as not all charities have submitted their annual return for this financial year. These zero-income charities can be thought of as ‘inactive’, though often there are valid reasons for not reporting any incoming resources in a given year e.g., charities waiting to receive an endowment/legacy. It is also possible that

charities may be able to operate without any income, if they possess reserves and/or if they are able to maintain their operations entirely through volunteer effort: for example, fewer than 35% of indigent Welsh charities actually have any paid staff. Once again, the trend is flat in Scotland (**figure 2b**), with c. 4% of charities filing zero-income annual returns to the regulator.

Figure 2a Zero-filer rate England & Wales

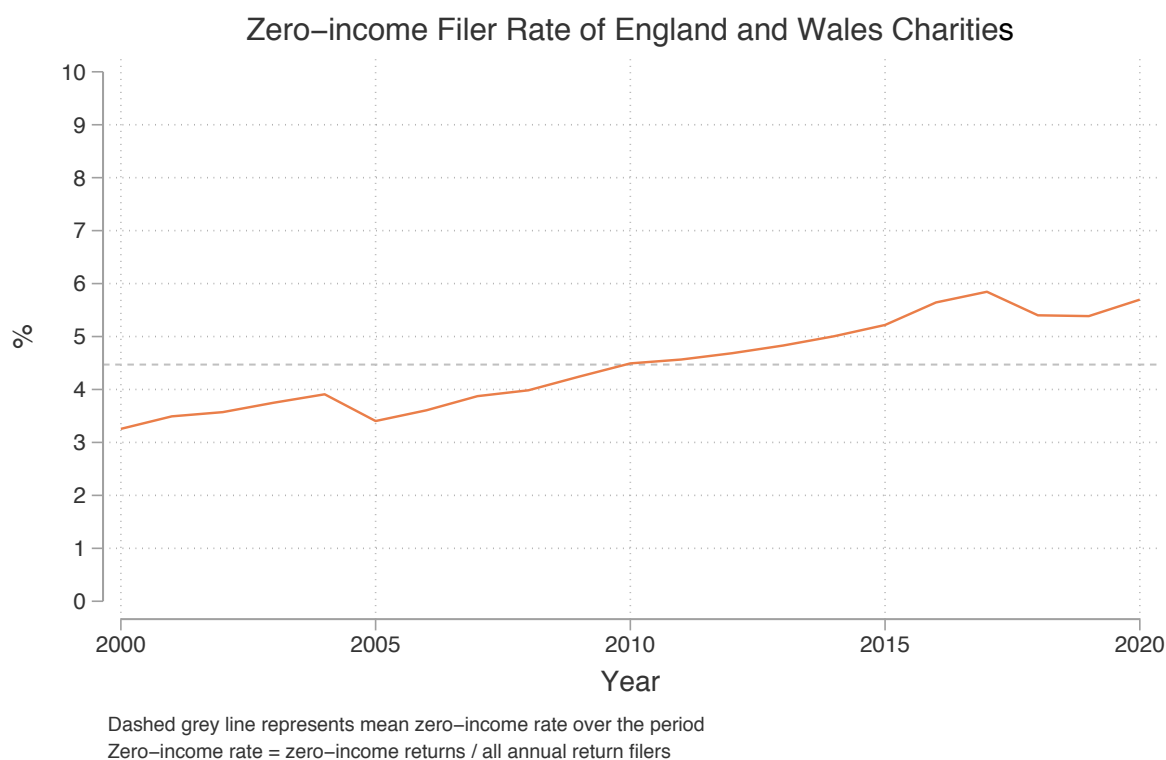
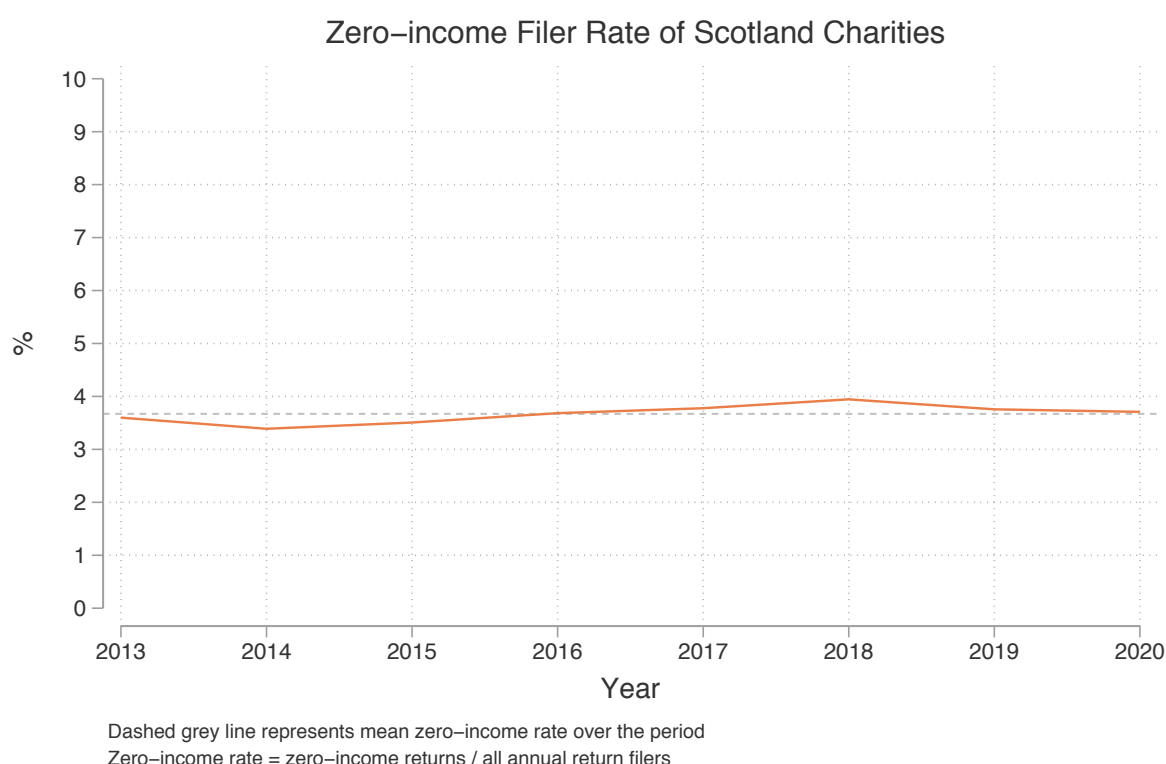


Figure 2b Zero-filer rate Scotland



Figures 3a and 3b present the proportion of registered charities not submitting an annual return for a given year. Non-filers mainly capture organisations who have failed to submit an annual return relating to a given year (rather than submitting late). In both jurisdictions the rate is stable since 2010 at c. 8-10% and the precipitous rise

in 2020 is – at this juncture – attributable to the fact that many charities have yet to submit their annual return for this year. The gradual downward trend between 2000 and 2010 in England and Wales may well reflect periodic purges of the register by the Charity Commission.

Figure 3a Non-filer rate England & Wales

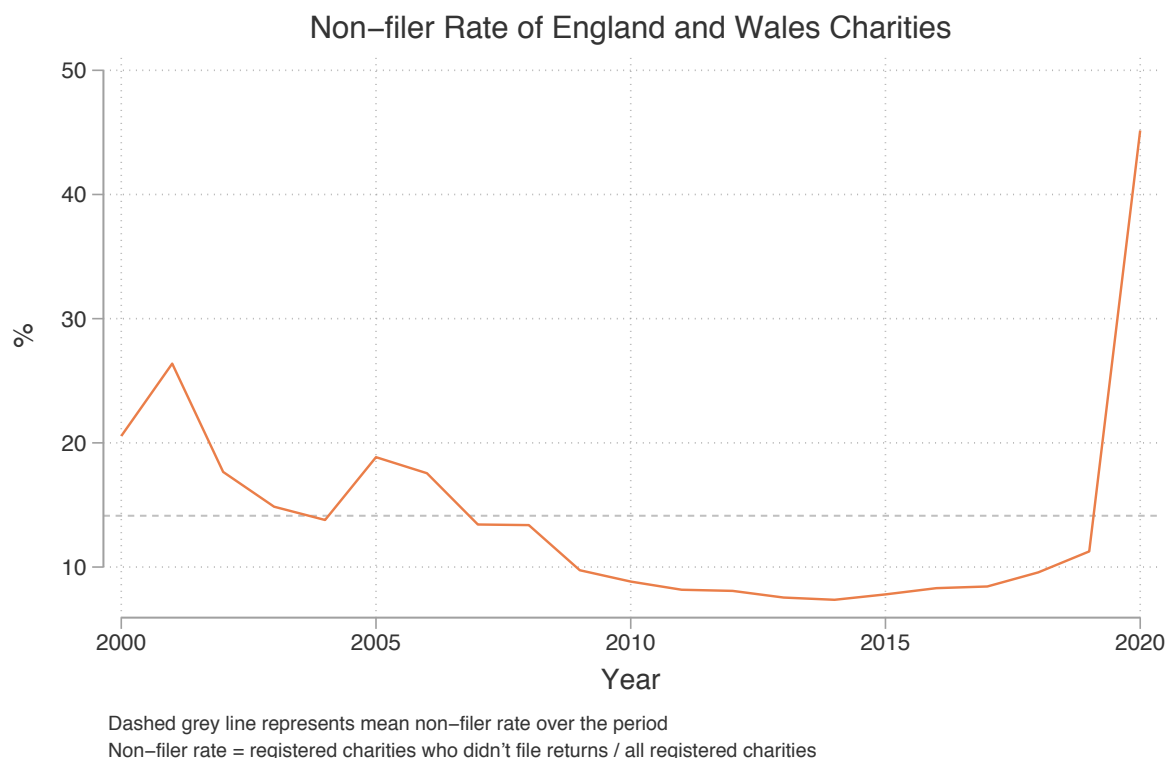


Figure 3b Non-filer rate Scotland

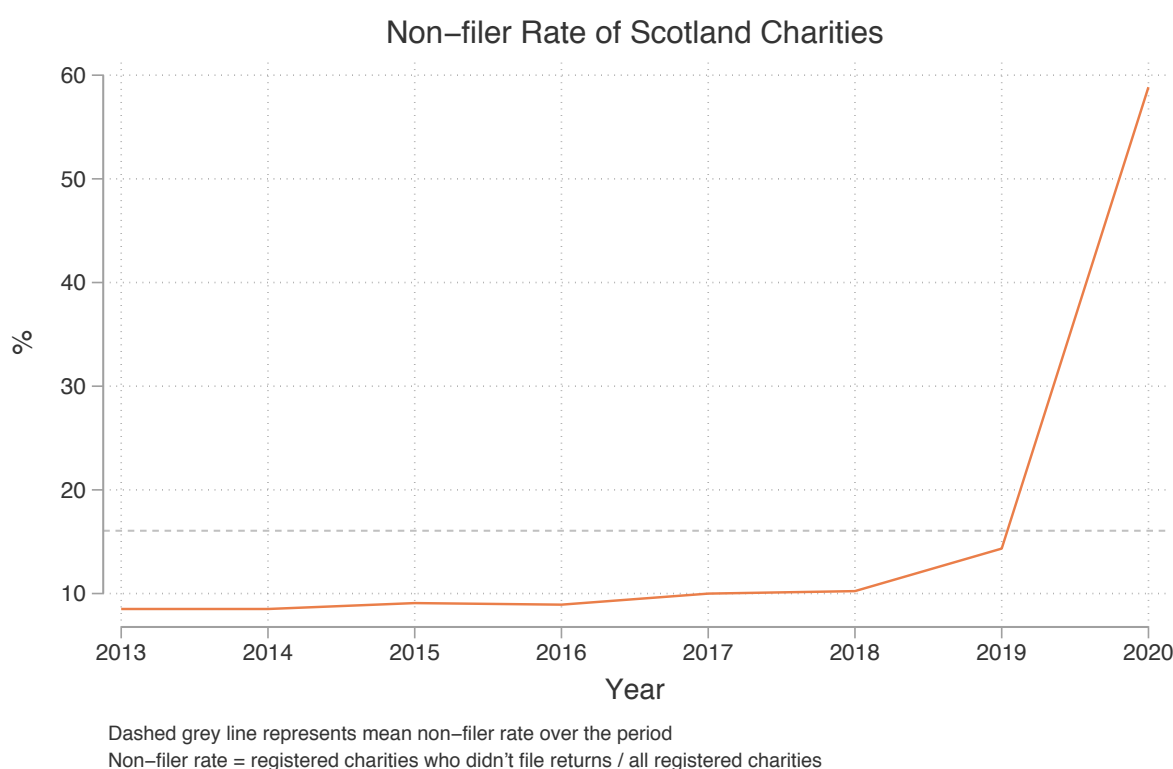


Figure 4 shows the monthly trends in dissolutions since 2015. There is a clear seasonal pattern in the number of dissolutions, with these highest during January/February, and lowest in May/August/September. Therefore the post-March 2020 decrease in the level of dissolutions may simply be a function of an expected seasonal decrease heading into summer months. We control for this seasonality by using time series modelling.

We measure the size in the drop of charity dissolutions during lockdown using an Interrupted Time Series model. This estimates the size of the fall after the onset of COVID, controlling for the seasonal variation observed in the data. We use a linear regression model with a time trend and quarterly dummies.

Figure 4 Monthly Dissolution numbers England & Wales / Scotland



Figure 5a Interrupted Time Series model of Dissolutions England & Wales

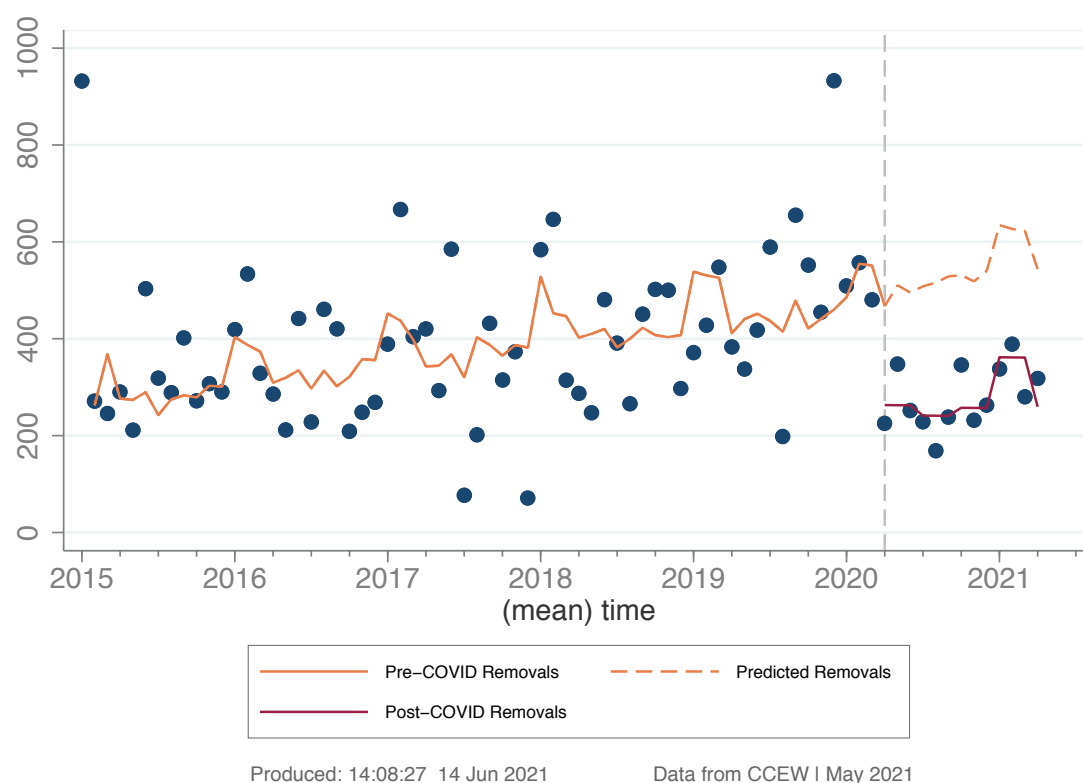


Figure 5b Interrupted Time Series model of Dissolutions Scotland

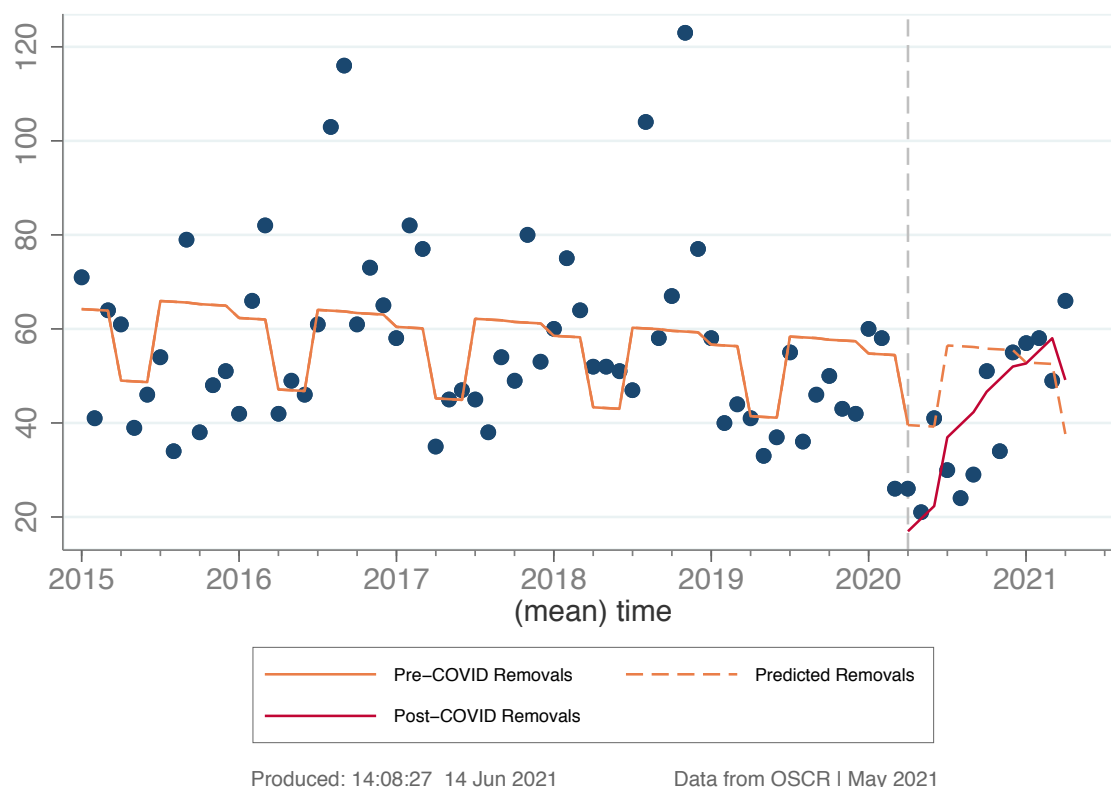


Figure 5a and 5b show the fitted models for England & Wales and Scotland respectively. The blue line shows the modelled level of charity removals before COVID-19. The dashed blue line shows the forecast of this model beyond March 2020, assuming that the pre-COVID patterns had continued. The red line shows the interrupted time series model, including the shift in the number of removals recorded after March 2020. This shows a steep drop in

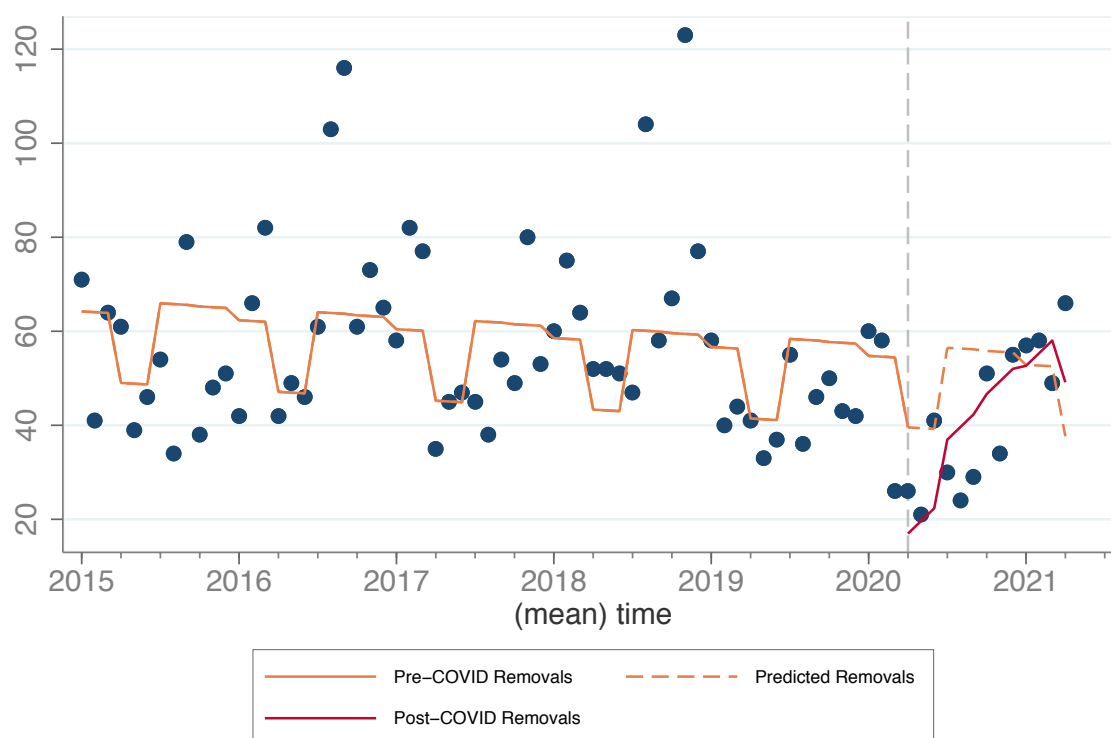
removals immediately following the onset of lockdown for both Scotland and England & Wales. It also shows that the number of removals in Scotland was relatively quick to return to its usual level during lockdown, while the number of removals in England & Wales has remained well below the historical pattern.

Insolvency

Examining data on insolvency has advantages and disadvantages. On the positive side, it is much more timely as companies which are insolvent must inform Companies House while they are still operating. However, the coverage of the data is less comprehensive: both because not all charities are companies, and because the majority of charities which dissolve do so without becoming insolvent.

Figure 6 shows that there is typically only about one insolvency every couple of months amongst charitable companies. However, post March 2020 this has been closer to 4 per month, with peaks of 8 charities insolvent in one month, and no months with zero insolvencies. Again the blue line shows the modelling of the pre-COVID pattern, including seasonal variation. The red line shows the jump in insolvencies during lockdown. It appears that this peak is now declining again, although it has not quite returned to its pre-COVID level.

Figure 6 Interrupted Time Series model of Insolvencies England & Wales



Produced: 14:08:27 14 Jun 2021

Data from OSCR | May 2021

Characteristics of dissolved charities

An important question to ask is: are there post-COVID differences in the composition of dissolved charities? That is, are different types of charities more likely to have been dissolved since the pandemic occurred? Thus far there is little evidence that the characteristics of dissolved charities in 2020 are different with respect to field of activity and region. For instance, we would expect 10% of dissolved charities in a given year to have worked in the field of culture and recreation, whereas in 2020 we observed 11% (a negligible difference – see **table 1**).

Table 1 Distribution of Field of Activity for Dissolved Charities England & Wales

Field of activity (ICNPO)	% of dissolved charities						
	2015	2016	2017	2018	2019	2020	Total
Culture and recreation	9	10	10	10	11	11	10
Development	6	7	5	6	7	6	6
Education	5	5	5	5	4	5	5
Employment and training	2	2	1	2	1	1	2
Environment	3	4	3	3	3	2	3
Grant-making foundations	6	6	7	6	7	5	6
Health	5	4	5	4	4	4	4
Housing	2	2	2	2	2	2	2
International	5	4	5	4	5	5	5
Law and advocacy	3	4	3	3	4	3	3
Other	17	17	17	17	13	18	16
Religion	12	11	12	12	13	13	12
Research	2	2	2	2	2	2	2
Social services	21	22	23	23	23	21	22
Umbrella bodies	1	1	1	1	1	1	1
Total	100	100	100	100	100	100	100
	4,332	4,058	4,229	4,966	5,868	3,840	28,986

Table 2 Distribution of Region for Dissolved Charities England & Wales

North East	3	4	3	4	4	4	4
North West	10	11	10	9	9	9	10
Yorkshire and the Hum	7	7	8	7	8	7	7
East Midlands	7	7	8	7	7	7	7
West Midlands	8	8	8	9	8	8	8
East of England	10	10	10	11	10	11	10
London	19	19	18	17	20	16	18
South East	15	17	17	16	15	18	16
South West	11	12	12	12	11	12	12
Wales	5	4	5	5	5	5	5
Unknown	3	1	2	2	4	2	3
Total	100	100	100	100	100	100	100
	4,332	4,058	4,229	4,966	5,868	3,840	28,986

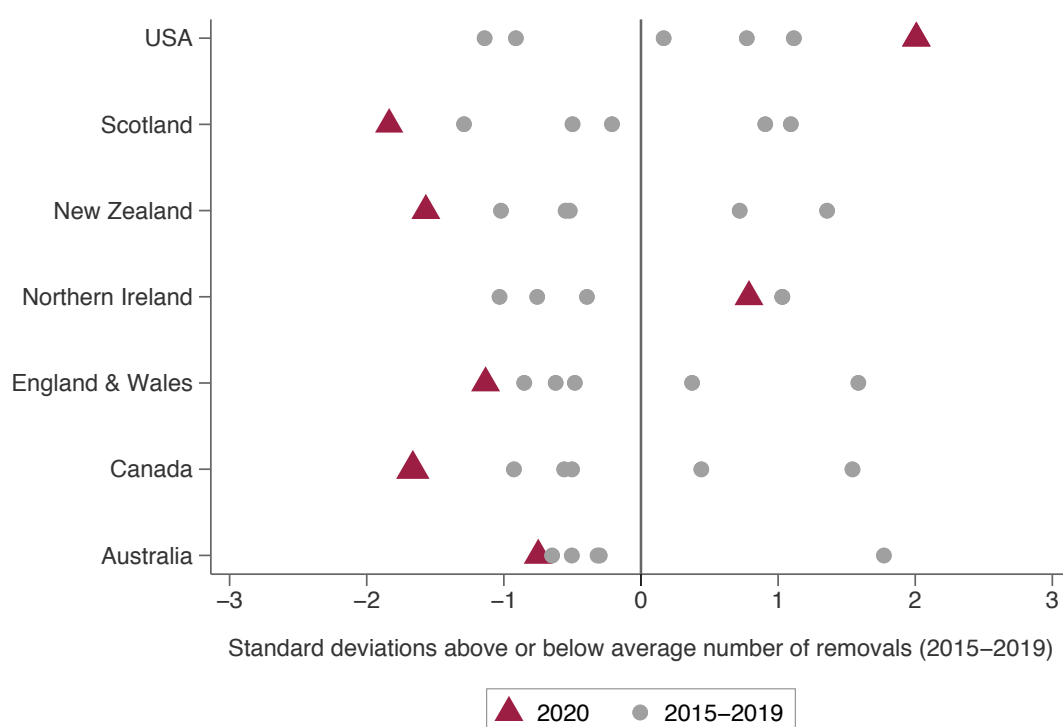
International comparison

Finally, we can compare the patterns in the UK to a number of other charity jurisdictions internationally. Are there jurisdictions where dissolutions are also below expected levels? **Figure 7** shows the how atypical (or not) 2020 has been for the number of dissolutions recorded across seven charity jurisdictions. Dissolutions are below expected levels for most jurisdictions, with the exception

of the US and Northern Ireland – in the case of the latter, this is almost certainly a function of regulatory issues around the registration and de-registration of charities in this jurisdiction. The drop in dissolutions compared to the historic (2015-2019) average is noticeable but not beyond conventional statistically significant thresholds (i.e., 2 standard deviations).

Figure 7 Excess dissolutions for seven charity jurisdictions, 2015-2020

Excess removals for charity jurisdictions



Foundations

The rate at which new charitable are founded across the UK has remained steady at c. 4% per annum, including for 2020 (see **figures 8a and 8b**).

Figure 8a Charity Registrations in England & Wales

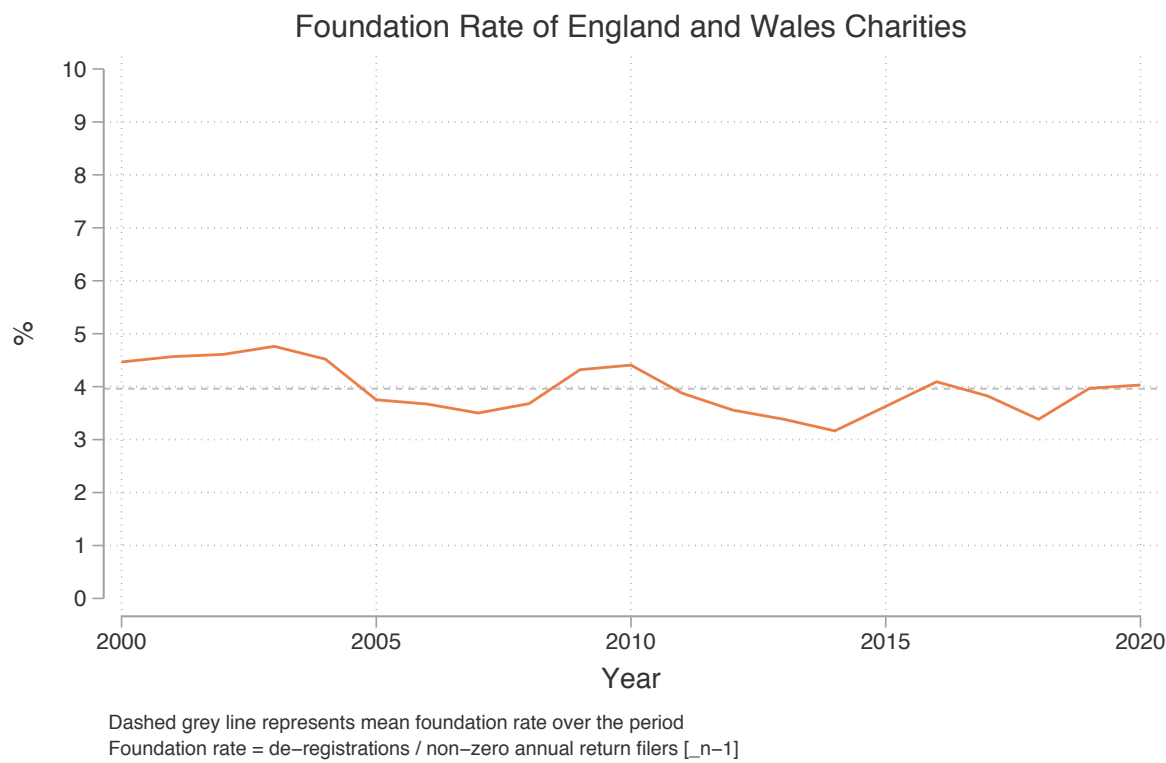


Figure 8b Charity Registrations in Scotland

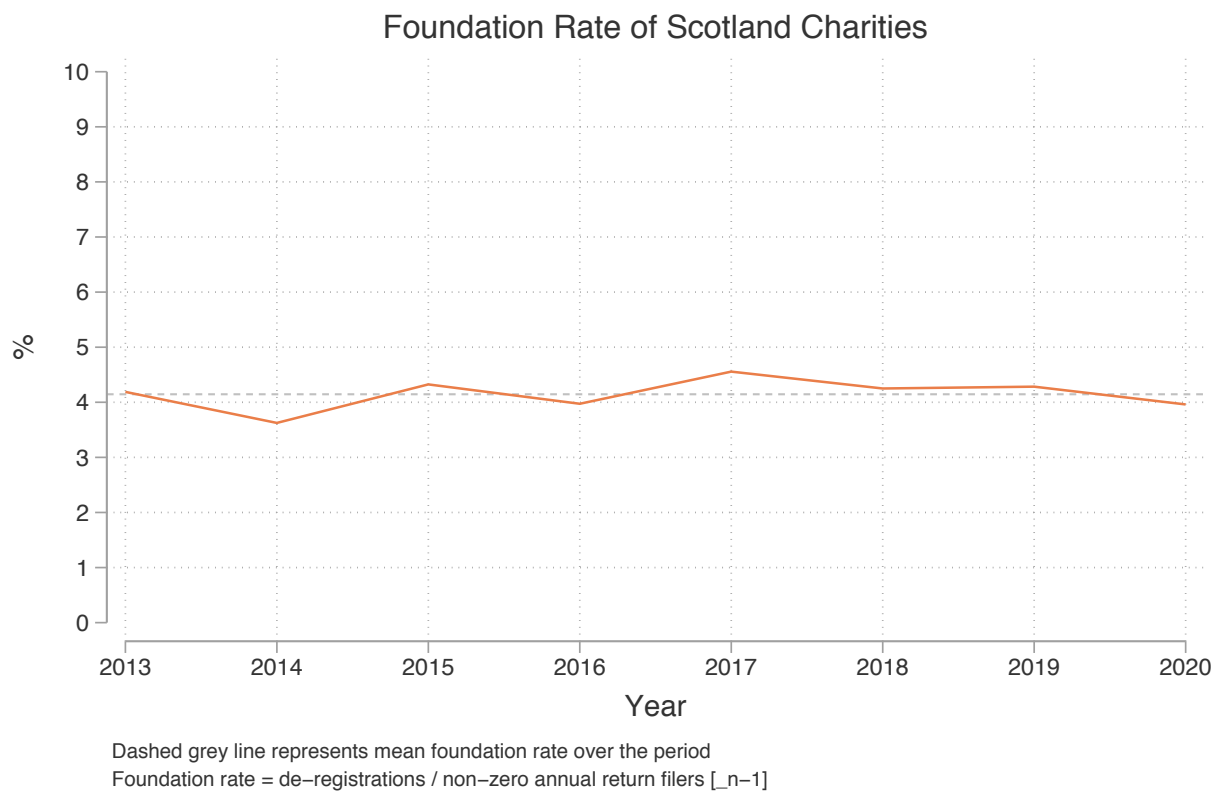


Figure 9 shows the monthly trends in foundations since 2015. There is a clear seasonal pattern in the number of foundations, with these highest during October/November, and lowest in February/March/August. There does not appear to be a post-March 2020 decrease in registrations, which we can confirm using time series modelling.

Figure 9 Monthly Foundation numbers England & Wales / Scotland

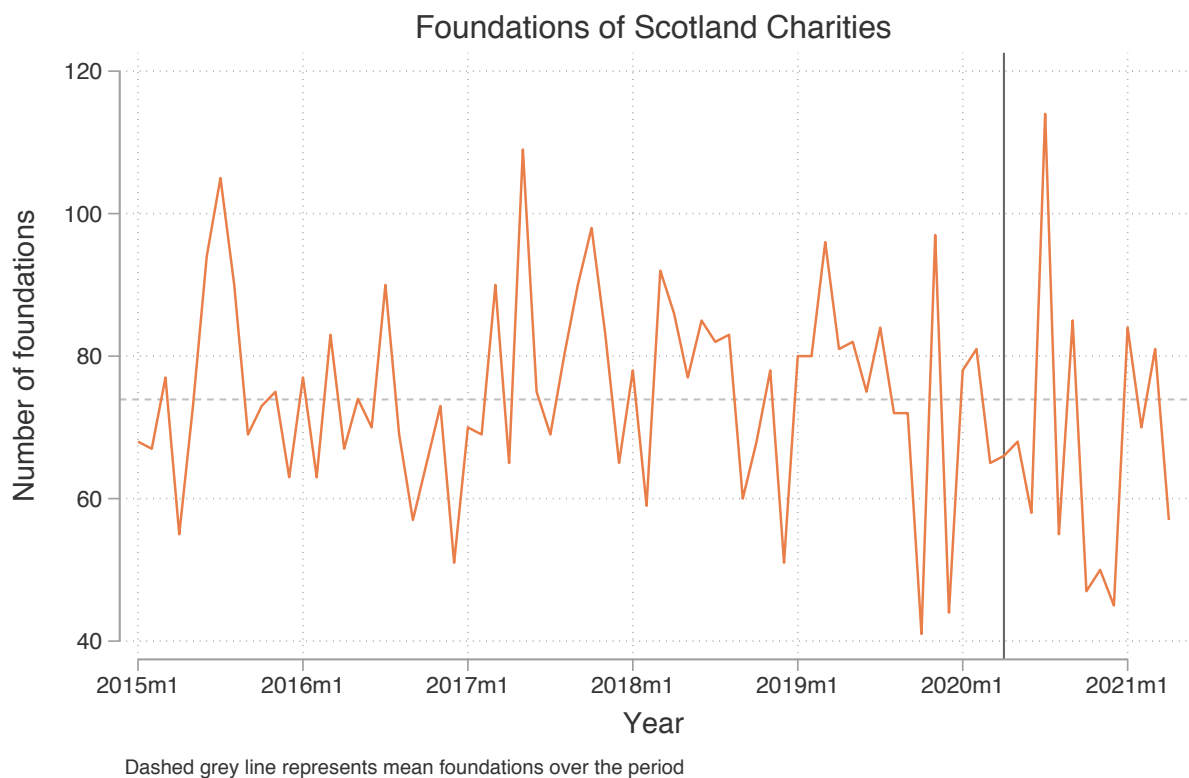
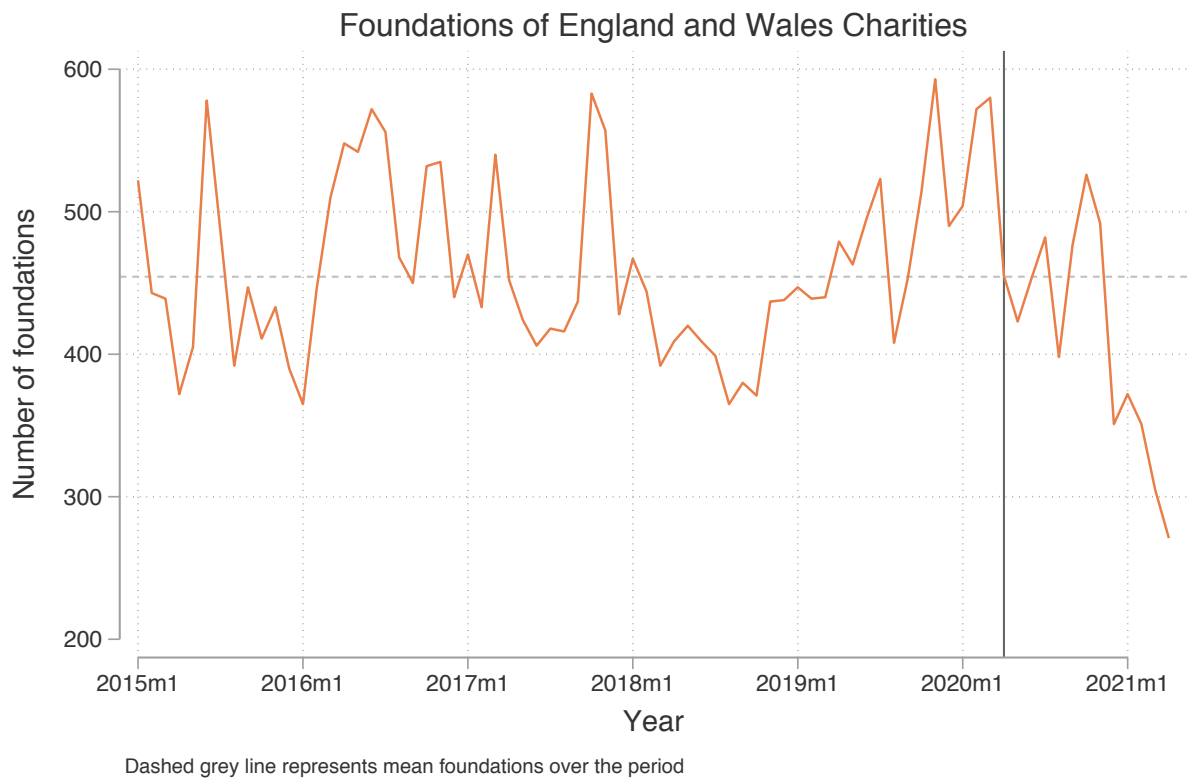


Figure 10 shows the results of an interrupted time series model of new charity registrations for (a) England & Wales and (b) Scotland. England & Wales has seen a sharp decline in the formation of new charities, with typical numbers registered in the months immediately

following lockdown, but far fewer than expected in late 2020 and early 2021. Scotland, in contrast, shows a much less pronounced drop in new charities, with registrations historically low but without a continuing decline through the COVID lockdown.

Figure 10a Interrupted Time Series model of Formations England & Wales

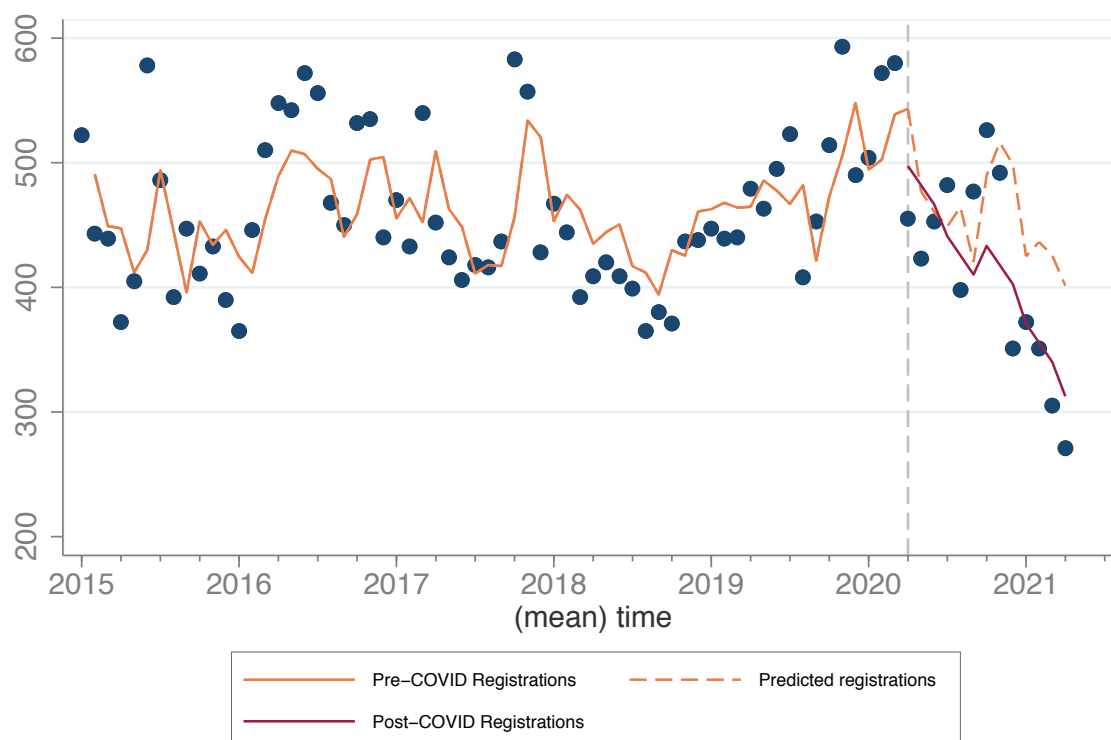
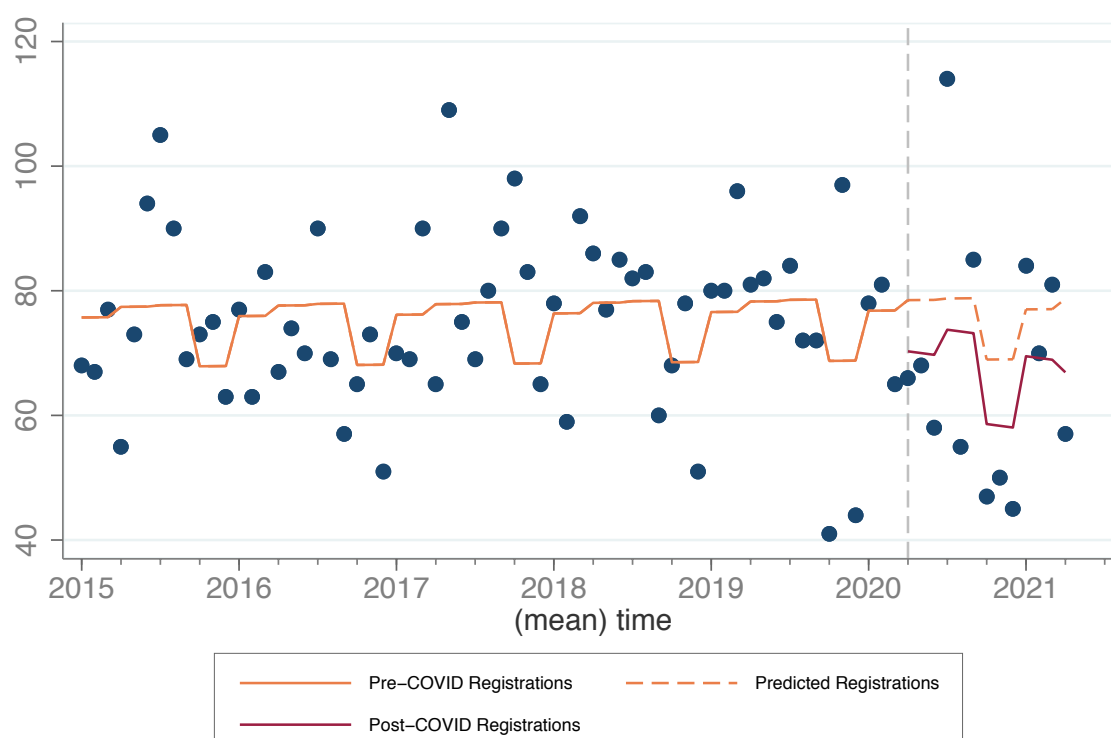


Figure 10b Interrupted Time Series model of Formations Scotland



International comparison

Finally, we can compare the patterns in the UK to a number of other charity jurisdictions internationally. Are there jurisdictions where foundations are below expected levels? **Figure 11** shows the how atypical (or not) 2020 has been for the number of foundations recorded across seven charity jurisdictions. We find considerable variation across the UK: foundations are slightly above average in England and Wales, slightly below average for Northern Ireland, and much less than average for Scotland. In fact only Canada has recorded a lower than average level of foundations than Scotland.

Figure 11 Excess foundations for seven charity jurisdictions, 2015-2020





Discussion

There was a significant drop in the number of dissolutions recorded on the registers of UK charity regulators, even allowing for disruptions to regulatory operations. This seems counter-intuitive given the observable implications of the pandemic response (e.g., shutting of charity shops, cessation of much volunteering activity) and the apocalyptic reports and prognostications founded on survey snapshots throughout 2020. This might hint at a situation where significant numbers of charities are in stasis: currently not operating and no longer intending to, but yet to notify the charity regulator.

“There was a significant drop in the number of dissolutions recorded on the registers of UK charity regulators, even allowing for disruptions to regulatory operations.”

Charity registrations were maintained in the early part of lockdown, but have since seen a more dramatic decline, particularly in England & Wales. This may represent the lead time involved in setting up a charity, with those registered in mid-2020 based on groundwork conducted pre-COVID, and it's only in late 2020 and early 2021 that we start to see the consequences of disruption to charity formation.

For a certain subpopulation – charitable companies – there has been a clear increase in insolvencies (albeit from low levels). The insolvency rate appears to be levelling off, perhaps suggesting the worst effects of the pandemic are over for this subpopulation.

“The contrast between the insolvency data and the charity register removals data suggests that no one dataset tells the whole story.”

The contrast between the insolvency data and the charity register removals data suggests that no one dataset tells the whole story. It suggests that the charity regulatory data may conceal the extent of financial distress that charities are experiencing during COVID-19. The insolvency data paints a bleaker picture, but is more uncertain as it is based on smaller samples of (on average) larger charities. However, if the threat to the operations of charities was to follow trends in the insolvency rate, that suggests that the failure rate of charities could be three or four times what we would expect in normal years. This would have significant consequences for the sector, and for potentially large numbers of service users.

Appendices

Appendix A

Worked example

For example, let's say there were 50 new charities registered in Scotland in June 2020 -- is that number large or small, expected or unexpected based on previous figures for January?

June 2015	60
June 2016	55
June 2017	82
June 2018	65
June 2019	75

The average number of new charities in June between 2015-2019 is: $(60 + 55 + 82 + 65 + 75) / 5 = 67$. So there are 17 fewer new charities in June 2020 compared to the average for 2015-2019. Of course, the figures for June vary each year, and thus we need to know if the figure for June 2020 falls outside the range of expected registrations for that month. Therefore we calculate the standard deviation of the average, which is 10, and use this to construct the range: 57 to 77 (i.e., 67 ± 10). So there are fewer new charities in June 2020 than we would expect.

Appendix B

We employ a research design and analytic method known as interrupted time series (ITS) to estimate a causal effect of the regulatory alerts on the serious incident reporting rate in each jurisdiction. ITS is a quasi-experimental approach to estimate the causal effect of an intervention on an outcome and is particularly suitable for analyses of policy changes occurring at a particular point in time (Briesacher et al., 2013). ITS analysis divides a time series – repeated observations of a single outcome over time - into two segments and employs regression to “measure statistically the changes in level and slope in the postintervention period compared to the preintervention period” (Penfold & Zhang, 2013, p. 539). If certain assumptions are met this approach offers a high degree of internal validity and is especially suitable for testing abrupt shifts in the level and slope of the outcome (Briesacher et al., 2013; Penfold & Zhang, 2013). The ITS regression model has four parameters (excluding the error term) and is specified as follows:

$$Y_t = B_0 + B_1T_t + B_2X_t + B_3X_tT_t + e_t \quad (1)$$

Y_t is the outcome variable measured at each equally spaced time point, B_0 is the intercept or constant, B_1T_t is the effect of the passing of time on the outcome (i.e. measures the slope), B_2X_t is the effect of the intervention (dummy variable: 0 = pre intervention time period, 1 = post intervention time period), $B_3X_tT_t$ is the effect of the interaction between time and the intervention (i.e. measures change in the slope as a result of the intervention), and e_t captures the model's error term.

The ability of ITS to produce unbiased estimates of a causal effect is predicated on a number of assumptions. The key assumption is that the pre-intervention level and trend represent correctly the outcome that would have occurred in the absence of the intervention i.e. the counterfactual (Briesacher et al., 2013). The identification of an intervention effect is also dependent on knowing the true pre-treatment functional form of the association between time and the outcome (Briesacher et al., 2013; Linden, 2015; Penfold & Zhang, 2013). Concurrently, the pre-treatment trajectory may not be a good predictor of the outcome in the absence of treatment (Morgan & Winship, 2007). In addition, the time the intervention occurred must be clearly identified; the outcome is measured objectively; and potential confounders in the form of contemporaneous competing interventions are discounted (Penfold & Zhang, 2013; Ramsay et al., 2003). We estimate our ITS model using the *itsa* package in Stata 15 (see Linden, 2015).

References

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1. We acknowledge that foundation of organisations usually antedates registration with the Charity Commission. Self-evidently, since the commission was only established in its modern form in 1961, the gap between an organisation coming into existence and being formally registered may be several centuries. For the purposes of this paper, however, and given that the commission has been in operation for 60 years, registration dates are a reasonable proxy for how long an entity has been in existence.

1.Note that excess events also captures a reduced level of registrations and de-registrations.



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