Calendar effects and crowdfunded projects

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1. Introduction

Little is known about the existence and impact of calendar effects for crowdfunded projects , contrary to other variables, which have been extensively analyzed (Devaraj and Patel 2016; Chan et al. 2020). Broadly speaking, calendar effects are economic effects that appear to be related to the calendar (day of the week, month of the year…). Prior literature shows that investment and purchasing decisions are influenced by calendar effects (e.g., Cross 1973; Patel and Sewell 2015; Kapoor et al. 1981; Rodrigues and Esteves 2010). However, nothing is known about the crowdfunding context where different funding motivations (supporting a project, pre- ordering a product, expecting financial returns, etc.), main projects' owners' needs (online promotion, capital for developing, etc.) and platforms' strategies exist (Borst et al. 2018), the question of calendar effects in crowdfunding is still open. In this paper, we seek to examine whether crowdfunded projects are subject to calendar effects.

To do so, we use an original dataset from Ulule, the leading French reward-based crowdfunding platform. We control for project and year fixed effects, as well as standard time- varying determinants identified by the prior literature (e.g., Hornuf and Schwienbacher 2018; Shafi and Mohammadi 2019). We find that, on average, projects receive significantly fewer contributions in August, during the weekend, and during national holidays. While the decrease in the number of contributions during national holidays is negligible, the number of contributions is 22% less on average during the weekend and is 9% less during summer vacations. Unlike for investors investing in stocks, the anomalous patterns we observe seem to stem from a rational opportunity cost calculation on the part of crowdfunders.

Our findings address three strands of the literature. First, in recent papers, researchers control for calendar effects when examining time series data on the contributions to crowdfunded projects (Hornuf and Schwienbacher 2018; Shafi and Mohammadi 2019). However, to the best of our knowledge, our paper is the first to specifically examine these calendar effects and examine alternative explanations for their existence. Second, in the literature aimed at better understanding the behavior of consumers, the opportunity costs they face when shopping has long been recognized as an important driver of their purchasing decisions (Patel and Sewell 2015; Kapoor et al. 1981). Our findings suggest that reward-based crowdfunding projects are subject to the same phenomenon. When the opportunity cost of online funding is greater (spending less time with the family and not going on vacation), users contribute less. Third, psychological literature shows that specific times of the year are associated with different mood states that may affect consumers' decisions. January is associated with the uplifted mood of the New Year period (Thaler, 1987). March is associated with the highest recovery from seasonal affective disorder and Friday induces an upbeat mood in anticipation of the weekend break (Kamstra et al., 2017). In contrast, September and October are associated with the highest onset of the seasonal affective disorder effect and Monday induces a downbeat mood at the start of the week (Kamstra et al., 2017). We do not find strong empirical support for mood-driven patterns of contributions to crowdfunded projects. Unlike for stocks, for which prior literature documents the extent of calendar anomalies (e.g., Ariel, 1987, French, 1980; Gibbons and Hess 1981), which are hard to explain away using rational calculation of investors, the calendar pattern we document for crowdfunded projects seems to rely on an opportunity cost explanation, perhaps because crowdfunders behave more like consumers than investors.

2. Data sources, sample, and empirical methodology

2.1. Data sources and sample

Our dataset is from Ulule, which hosts presales projects from young companies and social, cultural, and personal projects from social firms, associations, and private individuals. We decided to work on reward-based crowdfunding because it is the only type of crowdfunding with such a high quantity of daily contributions based on individual and personal decisions. In equity crowdfunding, there are too few projects and contributions, and, on lending platforms, funding decisions are often pre-programed by backers with bots, so that funding decisions are often automatically executed. Moreover, in reward-based crowdfunding, backers have access to a wide variety of projects, including technology, cultural goods, sports, or charities that is not matched by lending-based or equity-based crowdfunding. Ulule was created in October 2010 and has hosted 51,389 online campaigns and successfully acted as a financial intermediary for 34,461 campaigns up to January 2021. This platform is generalist with no specialization with regards to the sector or kind of project. Ulule coaches project leaders using workshops in order to prepare and promote their campaigns. Some online tools are also available for promoting projects, such as listing by popularity (an automatic filter for the projects with the most funders during the last 48 hours), the "project of the day," the use of social recommendations (the number of followers for a project, a tool that debuted in August 2014), and Ulule's newsletters.

Our sample starts in June 2010 and ends in April 2016. It consists of 18,803 unique projects and 671,954 project-day observations. It includes ongoing projects that are still seeking funding (5%), successfully funded projects (66%), projects that failed to be funded (27.5%), and cancelled projects (1.5%). 67.5% of projects managed to meet their goal. Table 1 reports the distribution of projects by tag and type of owner.

Table 1. Project information
Panel A. Tags

Tag	Freq.	Percent
Art & Photo	1,057	5.62
Charities & Citizen	3,657	19.45
Childhood & Educ.	743	3.95
Comics	446	2.37
Crafts & Food	811	4.31
Fashion & Design	623	3.31
Film & Video	3,595	19.12
Games	400	2.13
Heritage	209	1.11
Music	2,542	13.52
Other Projects	613	3.26
Publishing & Journal.	1,037	5.52
Sports	1,212	6.45
Stage	1,494	7.95
Technology	364	1.94
Total	18,803	100.00

Panel B. Owner Types

Owner Type	Freq.	Percent
Association	5,723	33.54
Business	1,423	8.34
Personal	9,917	58.12
Total	17,063	100.00

2.2. Empirical methodology

We create a set of calendar dummies at different frequencies: day-of-the-week dummies (i.e., Monday to Sunday), month dummies (i.e., January to December), and French national holiday dummies (e.g., the 21st of May) . Our main specification follows Hornuf and Schwienbacher (2018). Because our dependent variable consists of count data, we use a negative binomial model . Our set of control variables includes the standard determinants of the funding of a project. We estimate the following model:

$$\Pr(y_{i1}; y_{i2}; \dots; y_{it}) =$$

$$F(DoIC_{it} + Nb\ Days\ to\ End_{it} + Post_{it} + Nb\ Projects_t + Nb\ Cumulated\ Projects_t +$$

$$Growht\ Cumulated\ Projects_t + Nb\ Projects\ Same\ Tag_{it} + Nb\ Cumulated\ Projects\ Same\ Tag_{it} +$$

$$Growth\ Cumulated\ Projects\ Same\ Tag_{it} + Year_t + Calendar\ Effects_t) \quad (1)$$

Calendar Effects include days-of-the-week, month, and national holiday dummies. In line with the prior literature (e.g., Vismara 2018; Kuppuswamy and Bayus 2018; Hornuf and Schwienbacher 2018; Shafi and Mohammadi 2019), we control for the following time-varying determinants of the number of contributions a project receives: whether the funding goal is reached (Post), a vector of dummies indicating the first and last seven days of the cycle (DoIC), the natural logarithm of the number of days before the end of the funding campaign (Nb Days to End), the natural logarithm of the number of projects that accept pledges on day t (Nb Projects), and the natural logarithm of the number of projects with the same tags on day t (Nb Projects Same Tag). We further control for the total number of projects listed on the platform on day t (Nb Cumulated Projects) and its growth rate (Growth Cumulated Projects). We also derive these two variables for each tag (Nb Cumulated Projects Same Tag and Growth Cumulated Projects Same Tag). We include year fixed effects to capture the increase in the number of contributions experienced by all sorts of projects since the inception of Ulule. We include project fixed effects to capture unobservable and observable persistent project characteristics that may explain variations in the number of contributions such as the uniqueness of the project or the talent of its leader.

3. Results

Table 2 reports some summary statistics on our main variables. The average project has a funding campaign that lasts 47 days. A project receives on average 1.5 contributions per day that are worth 104.5€ (69.5*1.5). Our sample projects meet or exceed their funding goal on 13% of the funding days. On average, 500 different projects are presented daily to crowdfunding users and each project competes with 58 other projects belonging to the same tag category.

Table 2. Summary statistics

Variables definitions are provided in section 2.2.

Variables	#Obs	Mean	S.D.	Min	.25	Mdn	.75	Max
Nb Daily Contributions	671,954	1.44	8.65	0.00	0.00	0.00	2.00	4105.00
Value Daily Contributions	671,954	69.50	446.31	0.00	0.00	0.00	50.00	1.1e+05
Total Days of Campaign	671,954	46.64	20.51	3.00	32.00	44.00	59.00	335.00
Post	671,954	0.13	0.34	0.00	0.00	0.00	0.00	1.00
Nb Projects	671,954	502.12	210.81	4.00	344.00	539.00	644.00	894.00
Cumulated Nb Projects	671,954	10,099	5,644	4.00	5,302	10,055	15,014	19,900
Growth Cumulated Nb Projects (%)	671,954	0.19	0.40	0.00	0.09	0.15	0.22	100.00
Nb Days to End	671,954	23.32	17.71	1.00	10.00	20.00	33.00	334.00
Nb Projects Same Tag	671,954	59.44	43.11	1.00	25.00	50.00	89.00	211.00
Cumulated Nb Projects Same Tag	671,954	1153.61	1002.58	1.00	351.00	810.00	1789.00	3843.00
Growth Cum. Nb Projects Same Tag (%)	671,954	0.22	0.78	0.00	0.00	0.11	0.26	100.00

Figure 1a and Figure 1b show some major variations in the number of contributions per day across months and days of the week, respectively. We observe a large drop in August and during the weekend. These first observations warrant caution because they do not consider other factors that could possibly explain the observed difference that we control for in our regression setting. Figure 2a and Figure 2b show the number of ongoing funding campaigns per day across months and days of the week, respectively. The number of projects seeking funds on the platform also varies over time, matching the summer vacation pattern identified for the number of contributions. It supports controlling for the number of projects seeking funds in our model.

Figure 1a. Average number of daily contributions per project by months of the year

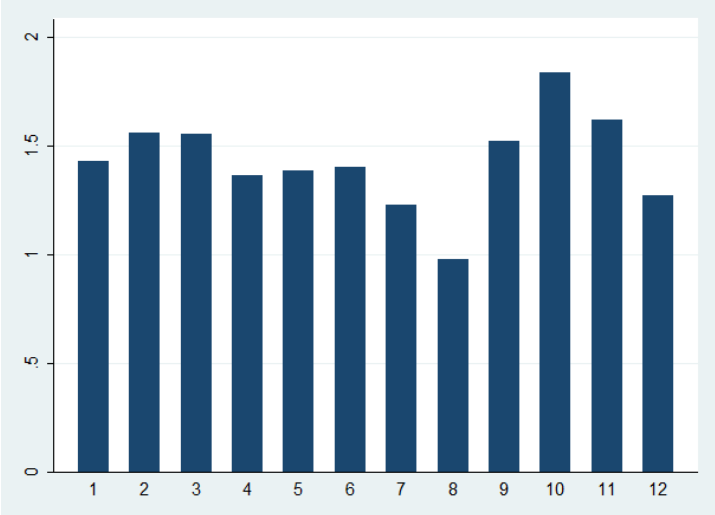

Figure 1b. Average number of daily contributions per project by days of the week (0 is Sunday)

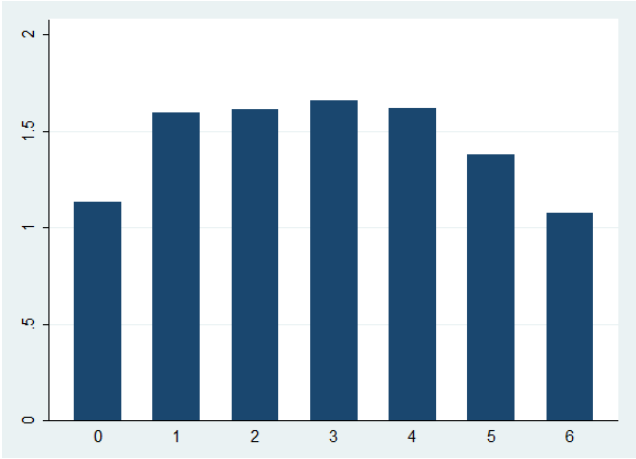

Figure 2a. Number of projects seeking funds by months of the year

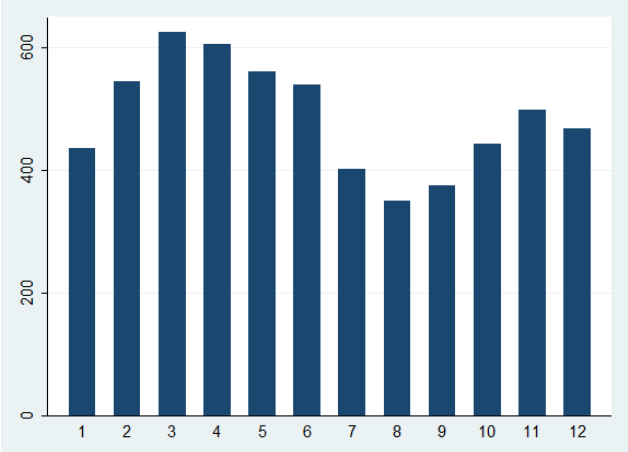

Figure 2b. Number of projects seeking fund by days of the week (0 is Sunday)

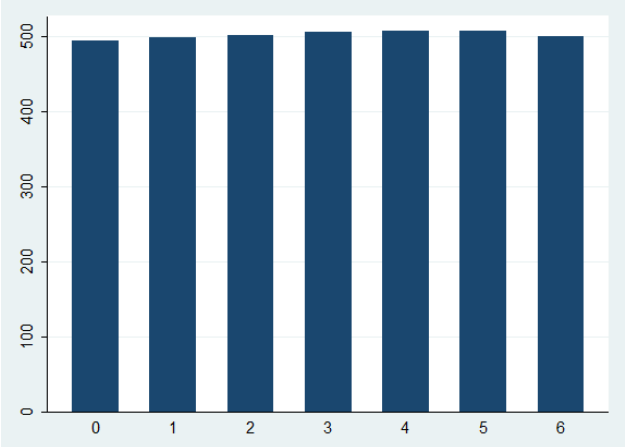

Table 3 reports the results of the estimation of our main model (model 1). The reported coefficients are incidence rate ratios. We observe that the rate ratios are lower than 1 for the nonweekend days of the week, indicating that the same project receives significantly fewer contributions during the weekend. When we create a dummy specifically capturing the weekend effect, we find that the number of contributions is 22% less on

average during the weekend. Given that the average number of days a project seeks funding is 47 days, which includes at least 6 weekends, we can extrapolate the average weekend effect on a project's funding. In economic terms, it amounts to a decrease in the number of contributions of approximately 3.8 contributions (0.22*1.44*2*6), which corresponds to a loss of 264 euros (69.56*3.8). This effect is sizeable with respect to the median goal of 2,500 euros in our sample (more than 10%).

We observe a clear pattern of a smaller number of contributions for August and July with respect to the other months, consistent with a summer vacation effect. When we create a dummy specifically capturing the summer vacation effect, we find that the number of daily contributions is 9% smaller on average during these two months. In economic terms, it amounts to a decrease in the number of contributions for a given project of approximately 6.1 contributions (0.09*1.44*47), which corresponds to a loss of 424 euros (69.56*6.1). This effect is sizeable with respect to the median goal of 2,500 euros in our sample (approximately 17%).

We observe that the number of contributions is statistically larger in January. The number of contributions is on average 4% larger on days in January. However, in economic terms, the effect is not meaningful. Aggregated over the full month, it results in an additional
0.43 contribution, which corresponds roughly to a gain of 30 euros (negligible with respect to the median goal).

Finally, compared with non-holiday days, the number of contributions is on average 14% smaller on holidays. However, in economic terms, this effect is not very meaningful. At most, over the average number of days a campaign is ran, there are 4 national holidays, which corresponds to a decrease in the number of contributions by approximately 0.80 or a loss of approximately 56 euros (negligible with respect to the median goal) .

Table 3. Baseline results

This table shows the estimation results of model (1). The dependent variable is the number of contributions for a specific campaign and day. The method of estimation is a panel-data negative binomial regression. Panel A shows the results with calendar dummies only. Panel B shows the results with calendar dummies and time-varying controls. Panel C shows results with dummy variables coding for summer vacations, January, weekends, and national holidays plus time-varying controls. All regressions include project and day fixed effects. Coefficients reported are incidence rate ratios. Significance levels (for coefficient being different from 1): * b 10%, ** b 5%, *** b 1%. Variables are described in section 2.2.

Panel A. Baseline model with calendar dummies only

Nb Daily Contributions	IRR	Std. Err.	z	P>z	[95% Conf.	Interval]
Monday	1.293966	.0079027	42.20	0.000	1.27857	1.309549

Tuesday	1.29954	.0079163	43.01	0.000	1.284116	1.315148
Wednesday	1.315562	.0079948	45.13	0.000	1.299986	1.331325
Thursday	1.241181	.0076337	35.13	0.000	1.226309	1.256233
Friday	1.110778	.0069721	16.74	0.000	1.097197	1.124527
Saturday	.9101687	.005954	-14.39	0.000	.8985737	.9219134
February	.9590373	.0090159	-4.45	0.000	.9415283	.9768719
March	.9328601	.0098199	-6.60	0.000	.9138107	.9523066
April	.8514361	.0097763	-14.01	0.000	.832489	.8708145
May	.8960534	.0111858	-8.79	0.000	.8743957	.9182475
June	.8709725	.0112054	-10.74	0.000	.8492849	.8932139
July	.8187813	.0111736	-14.65	0.000	.7971718	.8409765
August	.6735346	.0098794	-26.94	0.000	.6544471	.6931788
September	.9408176	.0129675	-4.43	0.000	.9157419	.9665799
October	.939432	.0121208	-4.84	0.000	.9159735	.9634912
November	.9635932	.0115038	-3.11	0.002	.9413078	.9864062
December	.8351195	.0088872	-16.93	0.000	.8178813	.8527209
National Holidays	.834643	.0087949	-17.15	0.000	.8175821	.85206
Constant	.6466188	.0430934	-6.54	0.000	.5674409	.7368448
Observations	671,954					
Year Fixed Effects	Yes					
Project Fixed Effects	Yes					

Panel B. Baseline model with control

Nb Daily Contributions	IRR	Std. Err.	Z	P>z	[95% Conf. Interval]	
Post	.4759422	.0030189	-117.05	0.000	.4700619	.4818962

Ln (Nb Days to End)	.9141231	.0038604	-21.26	0.000	.9065881	.9217209
Ln (Nb Projects)	1.355416	.0355792	11.59	0.000	1.287445	1.426975
Ln (Nb Cumulated Projects)	.6270305	.0271006	-10.80	0.000	.5761018	.6824614
Growth Nb Cumulated Projects	1.011496	.003954	2.92	0.003	1.003776	1.019275
Ln (Nb Projects Same Tag)	.9407498	.0096223	-5.97	0.000	.9220782	.9597994
Ln (Nb Cumulated Projects Same Tag)	1.027202	.0099881	2.76	0.006	1.007811	1.046966
Growth Nb Cumulated Projects Same Tag	1.012075	.0017674	6.87	0.000	1.008616	1.015544
Monday	**1.275882**	.0074176	41.91	0.000	1.261426	1.290503
Tuesday	**1.257456**	.0073127	39.39	0.000	1.243204	1.27187
Wednesday	**1.264168**	.0073451	40.34	0.000	1.249853	1.278646
Thursday	**1.191779**	.0070177	29.80	0.000	1.178104	1.205613
Friday	**1.064584**	.0064048	10.40	0.000	1.052105	1.077212
Saturday	.8906099	.0055576	-18.56	0.000	.8797835	.9015695
February	.9707822	.0096851	-2.97	0.003	.9519842	.9899514
March	.9751770	.0124945	-1.96	0.050	.9509931	.9999758
April	.9288988	.0137345	-4.99	0.000	.9023659	.9562118
May	.9948362	.0166238	-0.31	0.757	.9627818	1.027958
June	1.025406	.0186183	1.38	0.167	.9895561	1.062554
July	1.055633	.0206357	2.77	0.006	1.015953	1.096863
August	**.8926311**	.0194365	-5.22	0.000	.8553376	.9315506
September	1.108646	.0244631	4.67	0.000	1.061721	1.157644
October	1.147985	.0259076	6.12	0.000	1.098314	1.199903
November	1.187903	.0277937	7.36	0.000	1.134659	1.243646
December	1.091529	.0266397	3.59	0.000	1.040545	1.145011
National Holidays	**.8637565**	.0086463	-14.63	0.000	.8469753	.8808702
Constant	2.646242	.5160431	4.99	0.000	1.805664	3.878128
Observations	671,954					
Year Fixed Effects	Yes					
Project Fixed Effects	Yes					
7 Last Days Dummies	Yes					
7 First Days Dummies	Yes					

Panel C. Baseline model – alternative calendar dummies definitions

Nb Daily Contributions	IRR	Std. Err.	Z	P>z	[95% Conf.	Interval]
Post	.4769013	.0030275	-116.64	0.000	.4710043	.482872
Ln (Nb Days to End)	.9148109	.0038606	-21.10	0.000	.9072755	.9224089

Ln (Nb Projects)	1.211523	.0252566	9.20	0.000	1.163018	1.26205
Ln (Nb Cumulated Projects)	.8143376	.0173399	-9.65	0.000	.7810515	.8490424
Growth Nb Cumulated Projects	1.01745	.0038215	4.61	0.000	1.009987	1.024967
Ln (Nb Projects Same Tag)	.9418845	.0096237	-5.86	0.000	.9232099	.9609368
Ln (Nb Cumulated Projects Same Tag)	1.021899	.0099143	2.23	0.026	1.002651	1.041517
Growth Nb Cumulated Projects Same Tag	1.012734	.0017657	7.26	0.000	1.009279	1.016201
National Holidays	**.8616237**	**.0085779**	**-14.96**	**0.000**	**.8449743**	**.8786012**
Weekend	**.7806759**	**.0028328**	**-68.23**	**0.000**	**.7751435**	**.7862478**
January	**1.01092**	**.0097707**	**1.12**	**0.261**	**.9919502**	**1.030253**
Summer Vacations	**.9135457**	**.0073796**	**-11.19**	**0.000**	**.8991958**	**.9281246**
Constant	.6632808	.062591	-4.35	0.000	.5512812	.7980346
Observations	671,954					
Year Fixed Effects	Yes					
Project Fixed Effects	Yes					
7 Last Days Dummies	Yes					
7 First Days Dummies	Yes					

Our findings suggest that reward-based crowdfunded projects are subject to the platform's users responding to the opportunity costs they face when making purchasing decisions (Patel and Sewell 2015; Kapoor et al. 1981). When the opportunity cost of online funding is greater (spending less time with the family or not going on vacation), users contribute less. This result confirms that contributions on reward-based crowdfunding platforms mainly come from planned behaviors (Shneor and Munim, 2019). Figure 2a and Figure 2b show the number of ongoing funding campaigns per day across months and days of the week, respectively. The number of projects seeking funds on the platform also varies over time, matching the summer vacation pattern identified for the number of contributions. This further suggests a rational interpretation of our findings whereby both users and owners are affected by time constraints during summer vacations or react to the greater opportunity cost of users (users by not contributing and owners by not listing a project at that time). While owners seem to be aware of the summer vacation effects and react accordingly (listing the project before or after), they cannot avoid the weekend effect. Backers can also decide to spend their time investing rather than spending time with their families.

4. Conclusion

In this paper, we examine the calendar effects on the online contributions received by crowdfunded projects. We find that, on average, a project receives significantly less contributions during summer vacations and the weekend, which has material consequences on a project's capacity to collect contributions. The decrease in the number of contributions is negligible during national holidays and the increase of contributions in January has a negligible effect in economic terms. Our results suggest that projects' owners (and the platform that advises them) seem to be aware of these calendar effects. The success of a campaign, among other things, depends on its timing, i.e., whether it runs during summer vacations and weekends. In conclusion, our study contributes to the knowledge on the success factors of crowdfunding projects and encourages platforms' CEOs and project leaders to pay even more attention to the timing of when a campaign starts.

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Appendix

Appendix A. Dates of French national holidays

Date	English name	French name
1 January	New Year's Day	Nouvel An
Friday before Easter Sunday	Good Friday	Vendredi Saint
Monday after Easter Sunday	Easter Monday	Lundi de Pâques
1 May	May Day/Labor Day	Fête du Travail
8 May	Victory in Europe Day	Fête de la Victoire
Thursday, 39 days after Easter Sunday	Ascension Day	Ascension
14 July	Bastille Day	Fête Nationale
15 August	Assumption	Assomption
1 November	All Saints' Day	Toussaint
11 November	Armistice Day	Armistice de 1918
25 December	Christmas Day	Noël