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Greasy Roads: The Impact of Bad Financial News on Road Traffic Accidents

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We use evidence from a natural experiment in Greece to study the effect of the announcement of austerity measures on road traffic accidents (RTAs). We use daily RTA data from 2010 and 2011, during which a number of austerity measures were announced, including salary and pension cuts and an increase in direct and indirect taxes. We find that controlling for other factors potentially influencing RTAs, the number of RTAs increased significantly on the first two days following the announcements of austerity measures. We put forward some tentative suggestions for why this happens.

KEY WORDS: Austerity measures; road accidents; well-being

1. INTRODUCTION

This article addresses the causal relationship between "bad financial news" and health-related behaviors. The bad news in question could not be better—or worse—really: the Greek austerity measures. The health-related behavior we consider is road traffic accidents (RTAs). We seek to establish causality through a natural experiment that considers the impact of the announcement of the austerity measures on RTAs in the days following an announcement.

Following the outbreak of the financial crisis, the Greek government agreed to a bailout package jointly funded by the International Monetary Fund (IMF), the European Union, and the European Central Bank (ECB) (known as the "Troika"), offered in installments . In exchange, Greece committed to reduce government deficit and implement a number of austerity measures. These measures have decreased aggregate demand and steeply increased the unemployment rate—from 11.3% in January 2010 to 18.4% in October 2011[(1)]—bringing the economy to stagnation and creating a high degree of uncertainty about the prospect of the Greek economy and its place in the Eurozone.

Many austerity measures were implemented in 2010 and 2011. These involved extensive salary and pension cuts, an increase in VAT rates and other indirect taxes, a decrease in personal tax allowance, and the introduction of new taxes and levies.[(2)] Different measures were announced at different stages in 2010 and 2011 as the crisis unfolded, and as the first interventions to address the fiscal problems did not meet their goals. At the same time, negative growth rates outbalanced any increased tax rates and cuts in expenditure.[(3)]

Previous research offers mixed evidence on the relation between economic conditions and health. For example, Martikainen argues that unemployment causally determines mortality;[(4)] Gallo *et al.* suggest that involuntary job loss is associated with strokes and depression;[(5,6)] Dávalos *et al.* find a positive association between the unemployment rate and drinking.[(7)] Other studies provide evidence suggesting that unfavorable health behaviors, such as unhealthy diets, smoking, drinking,

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and physical inactivity, increase during economic booms.[8–11]

In terms of the effects of financial circumstances on RTAs, since psychological distress preoccupies the mind,[12] higher levels of negative emotions—such as anxiety, worry, and stress—draw attention away from concentrating on the road and promote dangerous driving behavior, leading to an increased number of accidents.[13–15] According to Appel *et al.*, drivers feeling more tense, unpleasant, tired, or uncertain are more likely to make mistakes,[16] whereas Ford and Alverson-Eiland find a link between anxiety and driving performance.[17] It has also been shown that individuals with high levels of anxiety are more prone to commit distractive behavior and driving errors of omission.[18]

Apart from factors such as age and gender[19] and the use of mobile phones,[20] driving behavior is further susceptible to a number of life events. In an early paper, McMurray studies a panel of drivers over seven years and finds that RTAs and driving violations increase significantly around the period respondents were filing for divorce, a period identified as stressful.[21] A similar result for individuals experiencing marital separation as well as divorce is offered in Lagarde *et al.*, who additionally find a significant increase in the risk of having a serious accident following the hospitalization of the driver's partner.[22] Stress about one's finances also increases the likelihood of having a serious accident.[23] An interesting study showed that RTA fatalities increased by 31% three days after a publicized suicide,[24] underlining the combined role of mass media and suicide on RTAs, especially since the latter is also associated with recessions.[8]

Empirical research has also established a positive link between "driving anger" and accidents, as drivers with elevated levels of anger are more likely to engage in reckless driving and are prone to errors of judgment.[25–27] Insofar as "driving anger" prevails in individuals who experience intense "trait anger,"[28] such as work stress and anxiety,[29] then this will also increase the number of RTAs.[30]

Emotion and mood are not the only channels through which an announcement of austerity measures can lead to RTAs. By decreasing income and employment opportunities, such measures also (threaten to) decrease individuals' social status—an additional cause of significant mental disorders.[31] Through their impact on anxiety, such measures are plausibly causing incidents of sleep disorders and possibly fatigue, factors that are also linked with the occurrence of accidents.[13,32] It is also documented that unemployment (a result of drastic austerity measures, for example) decreases social cohesion by inducing suspicion and conflict among those who remain employed along with feelings of demoralization, anxiety, sadness, and disorientation.[33]

In addition, Vohs *et al.* present experimental evidence suggesting that merely the thought of money pushes people into an individualistic frame of mind by being, for example, less helpful and less giving than others.[34] Hence, with austerity measures dominating the media, individuals are constantly primed to think about "money," which, in combination with reduced social cohesion, arguably leads to individualistic and socially insensitive behaviors, including careless/aggressive driving.

Having said all this, an adverse financial situation could lead to fewer RTAs, as individuals choose to commute using other, more affordable, means of transport.[35] Despite the fact that countries with a high GDP are arguably able to offer better road infrastructure and driving education standards, it has been suggested that an increase in GDP per capita in already rich countries does not significantly reduce the number of RTAs but significantly reduces the number of fatal ones as wealthier individuals can afford safer cars.[36]

So against this background, this study examines whether the announcement of austerity measures led to an immediate (though temporary) increase in RTAs in the days following the announcements in Greece. There is already empirical evidence on the links between the economic crisis and major depression among Greeks[37] and following the evidence described above, it is reasonable to expect that austerity measures in addition cause anxiety, distraction, frustration, and a lack of trust in the system and in other people, thus affecting driving behavior.

The rest of this article is organized as follows. Section 2 presents the data and econometric models. Results are reported in Section 3. Section 4 concludes.

2. DATA AND METHODS

We use daily RTA data spanning over the period January 1, 2010–October 31, 2011, extracted from the Greek police website.[38] Prior to 2010, police only report aggregate figures on accidents on a monthly basis, which is not appropriate for the purposes of this study. We consider all recorded accidents of any level of severity. Over this time period, we identified 14 announcements, which are explained in Table AI in the Appendix.

Let *lAccidents* denote the logarithm of the total number of daily RTAs. The econometric model, estimated via OLS, is then the following:

$$\begin{aligned} lAccidents_i = {} & \beta_0 + \beta_1 Announcement_i + \beta_2 lPetrol_i \\ & + \beta_3 Unemployment_i + \beta_4 Holiday_i \\ & + \beta_5 Strike \\ & + \beta_6 DaylightShavingTime(spring)_i \\ & + \beta_7 DaylightSavingTime(autumn)_i \\ & + \beta_8 day_i + \beta_9 season + \varepsilon_i, \qquad (1) \end{aligned}$$

where *Announcement* is a dummy variable equal to 1 for the day(s) (depending on the model) following an announcement of austerity measures. As a proxy for traffic volume we control for the average weekly log-price of petrol (per liter), denoted by *lPetrol*, obtained from the European Commission and measured in Euro cents. Gasoline prices increased throughout the period studied here due to a higher petrol levy, which might either impact the number of accidents negatively—as individuals move toward more affordable means of transportation—or positively—as fewer cars in circulation gives the opportunity to speed more. We include the monthly unemployment rate, *Unemployment*, obtained from the Hellenic Statistics Authority,[1] to control for fewer people driving to go to work, as well as for general macroeconomic conditions. *Holiday*, *Strike*, and *day* are dummy variables for national holiday periods,[3] general strikes—when there is less work-related traffic—and day of the week effects, respectively.[4] Particularly for holiday periods, however, there is a significant number of people traveling to holiday destinations by car, so the expected coefficient of this dummy variable may take either sign.

Petrol prices and the number of accidents are transformed into logarithms because this allows to estimate elasticities, thus making it easier to interpret the results.[39] This transformation, however, is not possible for dummy variables, so these remain untransformed. Unemployment is already measured as a percentage rate, so this variable also does not need to be transformed, as its interpretation is straightforward.

DaylightSavingTime(*spring*) and *DaylightSavingTime*(*autumn*) are dummy variables equal to 1 for seven days following a switch to and from daylight saving time (DST) in the spring and autumn, respectively. It has been suggested that time changes result in significant disruptions of human behavior.[40] More specifically, changes in time are associated with more accidents in spring,[41] whereas one additional or less hour of sleep can lead to more accidents in spring and fewer in autumn, respectively.[42] Hicks *et al.* find that DST changes lead to a higher number of accidents in both seasons.[43] Others have shown that full-year DST would have led to a significant decrease in the number of pedestrian and vehicle occupant fatalities.[44,45] Some studies, however, find no effect of DST on the number of accidents.[46–48]

Additional factors potentially affecting RTAs are road infrastructure and driving education, both of which are unobserved in our case. As our analysis is focused on a relatively short time interval, these are considered to be fixed. There is also evidence that a corrupt police force leads to increased RTAs by not enforcing traffic rules sufficiently.[49] As above, we can treat this as fixed with a certain degree of confidence, especially since no new traffic laws were implemented over the period studied.

3. RESULTS

Summary statistics are presented in Table I. About 40 accidents occur on a daily basis in Greece, the overwhelming majority of which are nonfatal.

Results of the baseline econometric model are presented in Table II. The main explanatory variable, *Announcement*, is a dummy equal to 1 on a day following an announcement of austerity measures ($t + 1$). As the effect of an announcement diminishes over time, we estimate separate regressions for subsequent days. Thus, for the second day following announcements ($t + 2$), the explanatory variable takes the value of 1 only for that day, whereas the previous day ($t + 1$ in this case) is excluded from the sample. For day 3, the dummy variable takes the value of 1 only for the third day following an announcement

[3] As "holiday periods" we do not consider only days that are actually a national holiday, but also periods between or around popular national holidays, when Greeks traditionally take their annual leave and bridge national holidays with weekends. For example, such periods are days between Christmas and New Year, the week before and after Easter, and the first two weeks of August, when the vast majority of workers take their holiday.

[4] The reference day of the week is Sunday, although the choice of reference day does not affect the magnitude or statistical significance of other explanatory variables.

Table I. Summary Statistics

Variable	Mean	*SD*
Total daily accidents	39.581	8.869
Nonfatal accidents	36.590	8.432
Fatal accidents	2.991	1.884
Petrol price/liter	134.398	13.521
Unemployment	14.418	2.417
Holiday[a] (0: no holiday)	0.202	0.402
Strike[a] (0: no general strike)	0.021	0.143
DaylightSavingTime(spring)[a] (0: days not affected by the change of time in spring)	0.021	0.143
DaylightSavingTime(autumn)[a] (0: days not affected by the change of time in autumn)	0.013	0.115

Notes: Observations drawn over 669 days.
[a]Binary variables, for which statistics represent sample proportions.

Table II. RTA Baseline Model

	(1) $t+1$	(2) $t+2$	(3) $t+3$
Announcement[a]	0.09*	0.074*	– 0.03
	[0.038]	[0.037]	[0.051]
lPetrol	– 0.405**	– 0.389*	– 0.406**
	[0.152]	[0.155]	[0.156]
Unemployment	– 0.006	– 0.008	– 0.007
	[0.006]	[0.007]	[0.007]
Holiday[a]	– 0.115**	– 0.113**	– 0.114**
	[0.026]	[0.026]	[0.026]
Strike[a]	0.011	0.011	0.016
	[0.054]	[0.055]	[0.056]
DaylightSavingTime(spring)[a]	– 0.052	– 0.052	– 0.053
	[0.06]	[0.06]	[0.06]
DaylightSavingTime(autumn)[a]	0.042	0.049	0.048
	[0.063]	[0.063]	[0.063]
Constant	5.532**	5.48**	5.551**
	[0.659]	[0.671]	[0.679]
Day of the week effects	Yes	Yes	Yes
Season effects	Yes	Yes	Yes
N	669	655	641
R^2	0.239	0.24	0.236

Notes: Regressions are OLS. Dependent variable is *laccidents*. Robust standard errors in brackets.
[a]Binary variable.
$^{**}p < 0.01$; $^{*}p < 0.05$.

($t + 3$), whereas the two previous days are now excluded from the sample. The intuition behind this step-wise exclusion of days following an announcement rests with the estimation of a robust impact on subsequent days, as according to our hypothesis former days are by definition no ordinary days to which subsequent days should be compared.

Our results suggest that traffic accidents significantly increase by about 9.5 (= 100 × [exp(0.09) − 1], as this is a semi-log model[50] and 8% (= 100 × [exp(0.074) − 1]) on the first and second day following the announcement, respectively (columns 1 and 2). We find no statistically significant impact on subsequent days, though we only report estimates up to three days following the announcement (column 3) for brevity.

Of the remaining controls, petrol prices are negatively associated with car accidents and there are also significantly fewer RTAs during holiday periods. The unemployment rate and general strike and DST dummies do not have a statistically significant effect on RTAs.

A sensitivity analysis of these results is presented in Table AII in the Appendix. Results on the first day following announcements are robust and statistically significant, which is not always the case for the second day. For robustness purposes, we additionally estimate a model incorporating all three days following announcements in a single regression, where each day following an announcement enters as a separate dummy variable in the same model without excluding any days as above. Results regarding the first day following announcements are similar to the ones presented in Table II and hold the same interpretation—see Table AIII in the Appendix, which also incorporates a sensitivity analysis.

Given our initial estimates, it is worth investigating what type of accidents increased following austerity announcements. We repeat our analysis above for nonfatal and fatal accidents separately. Results are presented in Table III. Similar to the results of Table II, we find a statistically significant effect on days 1 and 2 following announcements for the case of nonfatal accidents (columns 1–3). In particular, the number of nonfatal accidents is higher, demonstrating an increase of 11% (= 100 × [exp(0.107) − 1]) on the first day following announcements of austerity measures. The impact on the second day is again about 8%. There is no statistically significant effect by day 3. Results on the remaining variables are similar to those reported in Table II and hold the same interpretation.

Interestingly, we do not find a statistically significant effect on RTAs following announcements in the case of fatal accidents (columns 4–6). Note here that out of the 669 days in our entire sample, there were no fatal accidents reported on 39 days. The strictly nonpositive value of accidents leads to the exclusion of these 39 observations given the dependent

Table III. Fatal and Nonfatal Accidents

	Nonfatal			Fatal		
	(1) $t+1$	(2) $t+2$	(3) $t+3$	(4) $t+1$	(5) $t+2$	(6) $t+3$
Announcement[a]	0.107**	0.081**	– 0.021	– 0.205	– 0.046	– 0.14
	[0.04]	[0.041]	[0.054]	[0.17]	[0.19]	[0.179]
Lpetrol	– 0.363*	– 0.342*	– 0.353*	– 0.337	– 0.388	– 0.496
	[0.153]	[0.156]	[0.156]	[0.48]	[0.488]	[0.494]
Unemployment	– 0.007	– 0.009	– 0.008	– 0.015	– 0.014	– 0.01
	[0.006]	[0.007]	[0.007]	[0.02]	[0.02]	[0.021]
Holiday[a]	– 0.124**	– 0.122**	– 0.122**	– 0.011	– 0.012	– 0.024
	[0.027]	[0.027]	[0.028]	[0.063]	[0.063]	[0.063]
Strike[a]	0.023	0.024	0.028	0.10	0.097	0.11
	[0.049]	[0.049]	[0.05]	[0.143]	[0.143]	[0.143]
DaylightSavingTime(spring)[a]	– 0.068	– 0.068	– 0.068	0.119	0.115	0.111
	[0.069]	[0.069]	[0.069]	[0.14]	[0.14]	[0.14]
DaylightSavingTime(autumn)[a]	0.05	0.058	0.056	– 0.125	– 0.128	– 0.127
	[0.066]	[0.066]	[0.066]	[0.207]	[0.209]	[0.207]
Constant	5.246**	5.172**	5.219**	2.848	3.071	3.544
	[0.666]	[0.677]	[0.681]	[2.086]	[2.117]	[2.145]
Day of the week effects	Yes	Yes	Yes	Yes	Yes	Yes
Season effects	Yes	Yes	Yes	Yes	Yes	Yes
N	669	655	641	630	616	603
R^2	0.242	0.242	0.236	0.072	0.07	0.076

Notes: Regressions are OLS. Dependent variable is *laccidents*. Robust standard errors in brackets.
[a]Binary variable.
$^{**}p < 0.01$; $^{*}p < 0.05$.

variable being in logs. As an alternative, in order to utilize the entire sample, and for robustness purposes, we also estimate coefficients for the case of fatal accidents by measuring the dependent variable in (1) its untransformed form (i.e., in levels) rather than logarithms, and (2) by employing a Poisson log-link function—see Table A IV in the Appendix, columns 1–3 and 4–6, respectively. Results under these specifications are similar to those of Table III and hold the same interpretation.

The rest of this section is devoted to testing the robustness of our results. We first need to clarify any ambiguities related to our own selection of announcement dates. Would another selection of announcements differ substantially from ours and how would that affect the estimated coefficients of our models? We asked two students of Greek origin (raters) to go through the daily front pages of the popular Greek newspaper of record *Kathimerini* and allocate an indefinite number of important official austerity measure announcements without providing them with our own selection of announcements.

Rater A selected 11 announcements out of our original selection. Rater B selected 15 announcements in total: 13 out of our original selection and two additional ones—i.e., May 6, 2010 and December 14, 2010, which were about previously announced measures being passed in the parliament. The raters' selection is listed alongside our original selection in Table A I in the Appendix. The *kappa* value between our set of announcements and that of Raters A and B is 0.877 ($Z = 22.87$, $p < 0.0001$) and 0.893 ($Z = 23.14$, $p < 0.0001$), respectively, which indicates almost perfect agreement,[(51)] suggesting that we can reject the hypothesis that the raters are making their determinations randomly.[5]

We subsequently use each rater's set of announcements to check the robustness of our results. Note that Rater A's selection is nested within that of B's. The results, presented in Table IV, suggest that the degree of influence of the austerity announcements on RTAs is quite robust to both sets of announcements provided by the raters, though the effect disappears in day $t+2$ for Rater B's set.

The next robustness test addresses the possibility of RTAs being spurious to "news" of any sort. That is, what is the impact of a different event on

[5]The *kappa* measure of interrater agreement is 0.843 ($Z = 39.09$, $p < 0.0001$).

Table IV. Robustness Check: Raters

	Rater A (11 Announcements)			Rater B (15 Announcements)		
	(1) $t+1$	(2) $t+2$	(3) $t+3$	(4) $t+1$	(5) $t+2$	(6) $t+3$
Announcement[a]	0.082*	0.102**	– 0.017	0.092**	0.053	– 0.017
	[0.04]	[0.035]	[0.052]	[0.035]	[0.036]	[0.051]
Day of the week effects	Yes	Yes	Yes	Yes	Yes	Yes
Season effects	Yes	Yes	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
N	669	658	647	669	654	639
R^2	0.238	0.24	0.234	0.239	0.236	0.232

Notes: Regressions are OLS. Dependent variable is *laccidents*. Robust standard errors in brackets.
[a]Binary variable. Regressions control for the usual variables as in Equation (1). The difference in the number of observations is due to a step-wise exclusion of days following an announcement, which rests with the estimation of a robust impact on subsequent days, as according to our hypothesis former days are by definition no ordinary days to which subsequent days should be compared to. This differs from the number of observations in the baseline model due to the inclusion or exclusion of announcements.
** $p < 0.01$; * $p < 0.05$.

RTAs? For this purpose, we need to estimate the impact of an event that has the following properties: (1) has a wide effect on a large portion of the population, and (2) its result has an unambiguous effect. There is no perfect event satisfying these properties, but we believe the performance of the national football team is a promising case. Football is a major sport in Greece—the national team won the European Championship in 2004 and is ranked among the best teams in the world, ranging between 8th and 14th place in the monthly FIFA world rankings over the period of our sample.

We obtain national team match results from www.eloratings.net and include these in our analysis. Over our sample, the national team played 21 matches (12 victories, 6 draws, 3 defeats), whose impact we test on RTAs. Due to the limited number of draws and losses, we combine these two results. Three of 21 matches coincide with the days following the announcement of measures. As we include both football results and austerity announcements in the same regressions, however, this should not affect results. We use the same control variables as the baseline model.

Table V presents the results of draws and losses. These have no statistically significant impact on RTAs over the three days. The estimated coefficients corresponding to the austerity announcements on the other hand are robust, with a statistically significant effect of 9% ($= 100 \times [\exp(0.087) - 1]$) only for the first day following announcements. We additionally repeated this estimation by including victories of the team despite them having an effect opposite to that of the austerity measures. Results, also presented in Table V, are equally robust, where we further estimate a statistically significant coefficient of 7.8% ($= 100 \times [\exp(0.075) - 1]$) for the second day following the announcement as well.

4. DISCUSSION

The literature on RTAs suggests that driving behavior is influenced by negative emotions, such as anxiety and stress, drawing attention away from concentrating on the road and promoting dangerous driving behavior, thus potentially leading to an increase in the number of accidents.[13,14] Driving behavior is further influenced by a number of life events, such as divorce,[22] whereas limited evidence suggests that it is influenced by individuals' financial situation.[23]

In this study, we employ time-series RTA data for Greece—a Western economy implementing a variety of austerity measures in order to deal with its extraordinary debt crisis—over a two-year period (2010–2011). This offers an appropriate setting of a naturally occurring experiment resulting in the decrease of income. We find empirical evidence suggesting that the number of RTAs increases on days following an announcement of austerity measures. Results of the econometric analysis indicate that the announcement of such measures has a statistically significant and sizeable effect on the number of RTAs, which increase by about 9% and 8% on the first two days following announcements. This effect appears to be limited to

Table V. Robustness Check: Football Results

	Losses and Draws			Victories		
	(1) $t+1$	(2) $t+2$	(3) $t+3$	(4) $t+1$	(5) $t+2$	(6) $t+3$
Announcement[a]	0.087*	0.07	– 0.028	0.09*	0.075*	– 0.029
	[0.038]	[0.038]	[0.051]	[0.038]	[0.038]	[0.051]
Football[a]	0.047	0.058	– 0.026	– 0.006	0.016	0.032
	[0.059]	[0.057]	[0.04]	[0.079]	[0.042]	[0.039]
Day of the week effects	Yes	Yes	Yes	Yes	Yes	Yes
Season effects	Yes	Yes	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
N	669	655	641	669	655	641
R^2	0.24	0.24	0.237	0.239	0.24	0.237

Notes: Regressions are OLS. Dependent variable is *laccidents*. Robust standard errors in brackets.
[a]Binary variable. Regressions control for the usual variables as in Equation (1).
*$p < 0.05$.

accidents involving injuries only, as opposed to fatal accidents.

This is an immediate, short-lived effect that is attributed to the "shock" caused by the announcement of bad news affecting people's finances, jobs, and social status. There is a large empirical literature suggesting that well-being levels of individuals adapt to many changed circumstances—see, for example, Wu on heart conditions,[52] Oswald and Powdthavee and Pagán-Rodríguez on disability,[53,54] Riis *et al.* on haemodialysis patients.[55] Furthermore, Gardner and Oswald and Clark offer evidence on adaptation based on various life circumstances, such as unemployment, marriage, divorce, and widowhood.[56,57]

The immediate, but not long-term, effect that these announcements have on RTAs is thus not surprising given the ubiquitous nature of adaptation, and is consistent with Bradford and Dolan's adaptive global utility model[58]—according to which weights on various domains of life are optimally reallocated in order to maintain individuals' global utility—and Wilson and Gilbert's AREA model—according to which attention is initially allocated to a change, followed by a reaction to and explanation of it, subsequently followed by adaptation to it.[59]

This study is nonetheless subject to limitations. Only accidents that involve injuries or death are included in the sample. The reason is that these accidents are always recorded by police and thus included in their database, as opposed to accidents without any reported injuries, in which case the police are often not called to investigate. Data from insurance companies could be used instead in order to mitigate this problem of underreporting, although (1) people involved in minor crashes often prefer to pay for the damages out-of-pocket in order to avoid losing no-claims discounts, and (2) insurance companies do not share such detailed data on a daily basis. In addition, the use of aggregate daily data does not allow us to control for weather conditions, especially given the historical dimension of this study. The geographical record of accidents further limits this task as these are recorded at the wider regional level, whereas there are variations in weather conditions within and across regions. Moreover, our results should be generalized with caution because of the small number of announcements identified within the study period and due to being country specific. Future research can focus on developing similar hypotheses further or focusing on the impact of bad financial news on RTAs in other countries, and on other dimensions, such as domestic abuse and violent activities.

Notwithstanding such issues, bad financial news has an immediate sizeable positive impact on the occurrence of RTAs. Such information could potentially be taken into account by policymakers when deciding exactly when to announce austerity measures.

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APPENDIX

Table AI. Summary of Announcements

Date	Event	Rater A	Rater B
Feb 09, 2010	New income tax rates New way of calculating freelance and self-employed taxable income Salary freeze in public sector Decrease in salary supplements by 10% in public sector Decrease of overtime limit by 30% in public sector Higher retirement age	Yes	Yes
Mar 03, 2010	VAT increase 7–8% salary cuts in broader public sector 13th and 14th salary abolished Freeze and cut pensions Higher income tax rates for high earners Emergency income tax Higher tax rates for fuel, tobacco, alcohol, electricity, automobiles	Yes	Yes
Apr 23, 2010	Resorting to EU/ECB/IMF funding TV statement by the Prime Minister.	Yes	Yes
May 02, 2010	15% cuts in pensions over 1,400 Euros No hiring of new employees in public sector for three years Swift privatizations Increases in permitted lay-off rates 13th and 14th salary per year not to be taken into account when calculating pensions in private sector Abolishment of collective employment agreements	Yes	Yes
Dec 09, 2010	10% salary cuts in public sector corporations for salaries over 1,800 Euros 4,000 Euro salary cap Overtime payment capped at 10% of total salary expenditure per corporation Changes in labor legislation Probationary period for new employees during which they can be fired without compensation	Yes	Yes
Jun 15, 2011	Emergency income tax 1–3%, retrospectively since 2010 Reduction of allowance on property tax Higher property, automobile, boat, and swimming pool taxes	Yes	Yes
Jun 29, 2011	Measures announced earlier in June passed in Parliament, despite expectations by some that they would not	No	Yes
Sep 06, 2011	Further salary cuts Further changes in labor legislation Plan to fire workers in the broader public sector	Yes	Yes
Sep 11, 2011	New emergency levy on properties; this will be part of the electricity bill, in order to be swiftly collected	Yes	Yes
Sep 14, 2011	Emergency property levy even higher than previously announced	Yes	Yes
Sep 21, 2011	Personal tax allowance reduced Cuts of up to 20% for pensions over 1,200 Euros Further cuts to pensions for under-55-year olds Emergency levy on properties to be in place till 2014	Yes	Yes
Oct 02, 2011	Details on plans to lay off broader public sector workers	No	No
Oct 06, 2011	Salary cuts of up to 50% Most salary supplements abolished	Yes	Yes
Oct 20, 2011	Latest measures passed in Parliament	No	Yes

Notes: Dates and announcements retrieved from Greek newspapers. "Yes/No" indicate an agreement or otherwise on the importance of the announcement between our selection and the raters'. Rater B selected two additionally dates (May 6, 2010 ("memorandum of agreement" with the Troika passed in Parliament) and December 14, 2010 (measures of December 9, 2010 passed in Parliament)).

Table AII. Sensitivity Analysis

	$t+1$	$t+2$	$t+3$	$t+1$	$t+2$	$t+3$	$t+1$	$t+2$	$t+3$
Announcement[a]	0.093**	0.077	– 0.032	0.115**	0.104**	– 0.004	0.078*	0.057	– 0.046
	[0.031]	[0.041]	[0.05]	[0.036]	[0.037]	[0.047]	[0.032]	[0.04]	[0.054]
lpetrol				– 0.219	– 0.198	– 0.205			
				[0.148]	[0.151]	[0.153]			
Unemployment				– 0.014*	– 0.016**	– 0.016*			
				[0.006]	[0.006]	[0.006]			
Holiday[a]							– 0.116**	– 0.115**	– 0.115**
							[0.025]	[0.025]	[0.025]
Strike[a]							0.002	0.003	0.009
							[0.055]	[0.055]	[0.057]
DaylightSavingTime(*spring*)[a]							– 0.049	– 0.048	– 0.047
							[0.065]	[0.065]	[0.065]
DaylightSavingTime(*autumn*)[a]							0.052	0.057	0.052
							[0.066]	[0.066]	[0.066]
Constant	3.464**	3.466**	3.464**	4.719**	4.647**	4.673**	3.497**	3.499**	3.498**
	[0.026]	[0.026]	[0.026]	[0.644]	[0.654]	[0.663]	[0.027]	[0.027]	[0.027]
Day of the week effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Season effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	669	655	641	669	655	641	669	655	641
R^2	0.155	0.152	0.15	0.205	0.206	0.202	0.191	0.189	0.186

Notes: Regressions are OLS. Dependent variable is *laccidents*. Robust standard errors in brackets.
[a]Binary variable.
**$p < 0.01$; *$p < 0.05$.

Table AIII. Single Regression Estimates

$t+1$[a]	0.093*	0.110**	0.095**	0.120**	0.079*
	[0.038]	[0.035]	[0.031]	[0.037]	[0.032]
$t+2$[a]	0.071	0.091*	0.076	0.102**	0.056
	[0.038]	[0.044]	[0.041]	[0.037]	[0.041]
$t+3$[a]	– 0.030	– 0.052	– 0.030	– 0.004	– 0.044
	[0.051]	[0.056]	[0.050]	[0.047]	[0.054]
lpetrol	– 0.391*			– 0.192	
	[0.153]			[0.149]	
Unemployment	– 0.007			– 0.016*	
	[0.007]			[0.006]	
Holiday[a]	– 0.113**				– 0.115**
	[0.026]				[0.025]
Strike[a]	0.016				0.009
	[0.056]				[0.057]
DaylightSavingTime(*spring*)[a]	– 0.052				– 0.049
	[0.060]				[0.065]
DaylightSavingTime(*autumn*)[a]	0.044				0.052
	[0.063]				[0.066]
Constant	5.475**	3.648**	3.464**	4.610**	3.498**
	[0.665]	[0.010]	[0.026]	[0.648]	[0.027]
Day of the week effects	Yes	No	Yes	Yes	Yes
Season effects	Yes	No	Yes	Yes	Yes
N	669	669	669	669	669
R^2	0.241	0.008	0.157	0.208	0.193

Notes: Regressions are OLS. Dependent variable is l*accidents*. Robust standard errors in brackets.
[a]Binary variable.
**$p < 0.01$; *$p < 0.05$.

Table AIV. Robustness Check: Fatal Accidents

	Number of Accidents			Poisson		
	(1) $t+1$	(2) $t+2$	(3) $t+3$	(4) $t+1$	(5) $t+2$	(6) $t+3$
Announcement[a]	– 0.44	– 0.292	– 0.521	– 0.158	– 0.096	– 0.177
	[0.41]	[0.534]	[0.484]	[0.158]	[0.186]	[0.173]
l*petrol*	– 1.979	– 2.15	– 2.393	– 0.778	– 0.838	– 0.927
	[1.444]	[1.477]	[1.506]	[0.493]	[0.501]	[0.51]
Unemployment	0.007	0.014	0.026	0.006	0.008	0.013
	[0.063]	[0.065]	[0.066]	[0.02]	[0.02]	[0.021]
Holiday[a]	– 0.056	– 0.066	– 0.103	– 0.021	– 0.024	– 0.037
	[0.195]	[0.197]	[0.198]	[0.064]	[0.065]	[0.065]
Strike[a]	– 0.42	– 0.429	– 0.361	– 0.154	– 0.156	– 0.134
	[0.494]	[0.494]	[0.493]	[0.197]	[0.197]	[0.195]
DaylightSavingTime(*spring*)[a]	0.217	0.212	0.209	0.08	0.079	0.078
	[0.441]	[0.439]	[0.439]	[0.153]	[0.152]	[0.152]
DaylightSavingTime(*autumn*)[a]	– 0.292	– 0.31	– 0.307	– 0.092	– 0.097	– 0.096
	[0.55]	[0.551]	[0.55]	[0.18]	[0.18]	[0.18]
Constant	12.618*	13.338*	14.359*	4.794*	5.049*	5.422*
	[6.248]	[6.389]	[6.52]	[2.144]	[2.179]	[2.219]
Day of the week effects	Yes	Yes	Yes	Yes	Yes	Yes
Season effects	Yes	Yes	Yes	Yes	Yes	Yes
N	669	655	641	669	655	641
R^2	0.08	0.081	0.088			

Notes: Dependent variable is *laccidents*. Robust standard errors in brackets.
[a]Binary variable.
$^{**}p < 0.01$; $^{*}p < 0.05$.

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