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Unpleasant Surprises? Elections and Tax News Shocks

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ABSTRACT: Unanticipated changes in tax policy are likely to have different macroeconomic effects compared to anticipated changes due to several mechanisms, including fiscal foresight and policy uncertainty. It is therefore important to understand what drives such policy surprises. We explore the nature of unanticipated tax policy changes by focusing on a political economy determinant of those events, namely the timing of elections. Using monthly data for 22 advanced economies and emerging markets over the period 1990-2018, we show that implementation lags tend to be significantly longer for tax policy change announcements that are made during the pre-election periods, thereby leading to a lower likelihood of "tax news shocks". We also find that implementation lags become much shorter for tax policy changes that are announced in the aftermath of elections, generating more frequent tax news shocks. This pattern remains similar for different tax measures or types of taxes. The findings are robust to a number of checks, including alternative definitions of tax news shocks, or to controlling for various economic and institutional factors.

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WORKING PAPERS

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Prepared by Antonio C. David and Can Sever[1]

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1. Introduction

The macroeconomic effects of tax policy changes can depend on whether those changes are anticipated by the economic agents or not. When the duration between the announcement and implementation dates of tax policy changes is longer, that is, when the policy change is "anticipated", agents have more time to adjust their behavior (so-called "fiscal foresight" as discussed in Leeper et al. 2012, 2013), e.g., by substituting taxable activity into the present in anticipation of a future tax increase.[1] In fact, the extant literature finds significant differences in terms of the macroeconomic impact of tax policy changes when comparing anticipated and unanticipated policy changes (Mertens and Ravn 2011, 2012, 2014, Leeper et al. 2012, 2013, Ramey 2016). For instance, in a new Keynesian DSGE model with several standard frictions (including financially constrained, "hand-to-mouth" households), fiscal multipliers for government spending are much lower (and can be even negative on impact), when there is a large degree of fiscal foresight relative to the benchmark of no fiscal foresight (Leeper et al. 2012). In contrast, the output effects of increases in capital taxes in such models are larger in absolute value (i.e., more negative) especially at longer horizons, if there is significant fiscal foresight.[2] It is interesting to note that, while it is clear that the effects of policy changes differ in the presence of "fiscal foresight", it is not evident that anticipated policies are inherently welfare enhancing when compared to unanticipated policies.

Moreover, unanticipated tax policy changes, so called "tax news shocks", can affect macroeconomic outcomes by increasing (policy) uncertainty. Contrary to the fiscal foresight case, the theory and evidence clearly suggest that greater policy uncertainty in general can hinder economic performance by giving firms incentives to delay investment and hiring particularly under some conditions, i.e., when investment projects are costly to revert/cancel, or when there are costs associated to firing workers (e.g., Bernanke 1983, Bloom et al. 2007). High uncertainty can also pose a drag to economic activity with upward pressure on financing costs, or through precautionary spending cutbacks by households (e.g., Pastor and Veronesi 2013, Gilchrist et al. 2014). A large literature shows that policy uncertainty, including uncertainty related to tax policy changes, has adverse effects on macroeconomic performance (e.g., Rodrik 1991, Higgs 1997, Hassett and Metcalf 1999, Fernandez-Villaverde at al. 2015). Baker et al. (2016), for instance, find that "fiscal matters, especially tax policy, stand out as the largest source of policy uncertainty in the US", and show that periods of high policy uncertainty in the US and other major economies are a signal of reduced output, investment and employment.[3] It is also discussed that increased policy uncertainty, including regarding tax policy, around the Global Financial Crisis of 2008 contributed to the economic downturn during the period of 2008– 2009, and to the sluggish recovery afterwards (the Federal Open Market Committee 2009, IMF 2012, 2013).

In light of these potential effects of tax news shocks on macroeconomic outcomes through fiscal foresight and policy uncertainty channels, it is important to understand the determinants of tax news shocks. It is ultimately a matter of the implementation lags of tax policy changes, which drive tax policy surprises. To the best of our knowledge, however, there has been no study empirically tackling this question so far.

[1] In this case, such anticipation of taxable activity would entail an increase in output ("boom") at the time of the announcement of the tax increase, which would be followed by a decline in output as the tax increase is implemented. Conversely, an anticipated tax cut would be associated with a decline in output on impact and a subsequent recovery as the tax decrease is implemented.

[2] Relatedly, Sirbu (2019) proposes a model which distinguishes between the news regarding different types of taxes, and shows that good news about labor income tax rates (i.e., tax cuts) have little effect on expectations-driven business cycles, whereas good news about capital income tax rates can generate immediate effects, thereby leading to expectations-driven business cycles.

[3] In this regard, it is worth noting that several papers focus on the negative effects of elections on economic outcomes with a particular focus on their impact on policy uncertainty (e.g., Giavazzi and McMahon 2012, Julio and Yook 2012).

We explore the nature of tax policy surprises by focusing on a political economy determinant of those events, namely the timing of elections. In particular, we examine whether elections play a role on the duration of the implementation lag of tax policy changes, thereby affecting the likelihood of such policy surprises, which we call "tax news shocks". The analysis is based on monthly data for 22 advanced economies (AEs) and emerging markets (EMs) over the period 1990-2018 and a newly constructed dataset on election dates We show that implementation lags tend to be significantly longer for tax policy change announcements that are made during the pre-election periods, thereby leading to a lower probability of tax news shocks in those periods. We also find that implementation lags become much shorter for tax policy changes that are announced during the post-election periods, thus increasing the likelihood of tax news shocks after elections.

In general, governments can try to influence economic policies before elections by postponing unpopular policy changes, if they believe that such policy manipulation will make them more likely get re-elected. This can generate a cycle in economic policies, so-called opportunistic political business cycles (PBCs) or electoral cycles, characterized by expansionary (contractionary) patterns before (after) elections. Regarding electoral cycles in fiscal policy in particular, the theoretical literature suggests that election-motivated governments are likely to rely on expansionary fiscal policies before elections and postpone fiscal measures to the post-election periods. However, such policy manipulation works for governments only under certain conditions, for example, when voters cannot directly observe the competence of politicians, have short memory, are short-sighted, or are backward-looking (Nordhaus 1975, Rogoff and Sibert 1988, Persson and Tabellini 1990, Rogoff 1990, Alesina et al. 1997). If those conditions are not met, then politicians may not have enough incentives to make policy decisions based on the timing of elections. Hence, whether governments' policy choices differ around elections is indeed an empirical question.

To our knowledge, there is no previous study focusing on whether governments tend to behave differently in terms of the pace of implementation of tax policy announcements around elections, affecting the occurrence of tax news shocks. Electoral cycles in tax news shocks may arise for several reasons which can also depend on the direction of the policy change (i.e., tax increase or decrease). In the case of tax increase announcements that are made before elections, governments may want to postpone the implementation on purpose, since the implementation of those unpopular policy changes could likely hurt their electoral success. Conversely, governments may want to implement pre-election tax cuts relatively quickly for their re-election concerns.[4]

Regarding tax policy change announcements made in the aftermath of elections, newly elected governments may have more room and political power to maneuver to implement those quickly, potentially generating more frequent tax news shocks. This may depend on the direction of the change as well. For tax increase announcements that are made following elections, governments can have incentives to act quickly to implement them for two main reasons. First, they may want to rely on their political capital after elections to implement those unpopular policy changes. Second, they may prefer to implement those changes faster, when the electoral risks are minimal, since their unpopular actions are discounted by the electorate over time, generating a "political opportunity" to implement such changes when next elections are far away (Fair 1978, Berry and Berry 1992, 1994). For tax cut announcements made following elections, governments may choose to ride/boost their political capital leading a quicker implementation. But, they may also prefer to act slower in

[4] On the contrary, governments may announce tax cuts before election periods by committing to implement those changes in the aftermath of the elections to increase their probability of re-election, possibly leading to longer implementation lags in the case of those announcements.

implementing those changes, deliberately pushing the implementation closer to the next election, as a tool to reap the political dividend in that election. Whether these explanations apply in practice is ultimately an open empirical question that we tackle in this paper.

Our analysis is based on data on tax policy changes from the most recent version of the Tax Policy Reform Database (TPRD) constructed by Amaglobeli et al. (2018). The TPRD provides detailed information on tax policy changes (in the tax base and tax rates), types of taxes, the direction of the changes, the dates for the announcement and implementation, and the economic significance of those changes. We identify tax news shocks based on the duration of the time length from the announcement to the implementation of tax policy changes. For this purpose, we adopt a common approach in the literature on tax policy shocks, and categorize a policy change as tax news shock whenever this time duration is shorter than 90 days.

Contrary to the vast majority of the literature focusing on the effects of elections on economic policies in a cross-country setting, our analysis uses monthly data. Higher frequency data allows us to capture electoral cycles more precisely without cancelling out pre- and post-election effects (Akhmedov and Zhuravskaya 2004). Moreover, the use of monthly data improves the identification, as we are able to control for the impact of all economic and institutional factors on tax news shocks at country-year level, and also the effects of month-specific shocks that are common across countries.[5]

Our results suggest that the average monthly probability of tax news shocks (encompassing both tax increases and cuts) decreases by 2.6 percentage points (pp) during the 12-month period running up to the elections. This is economically important, since the average monthly probability of those events in the whole sample is 4.2 percent. We show that this lower probability is driven by the decreased likelihood of tax news shocks related to both tax increases and tax cuts. Focusing on the post-election months, we find that the average monthly probability of tax news shocks increases by 3.0 pp in the first 12-months following elections. Looking into the direction of policy changes, tax news shocks regarding both tax increases and tax cuts become less likely before elections, but more likely following elections. Following a more granular approach regarding tax measures and types, we show that these patterns also apply to changes in the tax base and rates, as well as consumption and income taxes. We also show that the post-election effects on the likelihood of tax news shocks are more pronounced in the case of AEs. The findings are robust to a large set of checks, including to alternative definitions of tax news shocks, or to accounting for differences in institutional capacity (or constraints) to implement the announced tax measures.

Alongside the impact of election periods, we also examine the role of economic factors, namely economic activity and inflation, on the likelihood of tax news shocks, since this issue has also been overlooked in the literature. These factors can influence government behavior to implement the announced changes in taxes in various ways. For instance, a slowdown in economic activity may incentivize the government to move quickly to implement a tax decrease announcement to support economic activity, thereby increasing the likelihood of tax news shocks. In contrast, higher inflation levels may lead the government to postpone the implementation of an announced tax decrease, making tax news shocks less likely. Therefore, it is important to assess whether the relationship between election periods and the likelihood of tax new shocks remains similar, when we control for these factors. Interestingly, our results show that neither of those economic variables

[5] Our identification strategy also relies on that election dates are mostly predetermined relative to the implementation lags of the announced tax policy changes, i.e., it is unlikely that a tax news shock would lead to an election. We also confirm this empirically later on by focusing on the elections whose dates are pre-determined.

seems to affect the occurrence of tax news shocks in our sample. More importantly in our context, controlling for these two economic factors does not change our main result regarding the effect of election periods on the probability of tax news shocks.

This paper contributes to the literature on opportunistic PBCs going back to the seminal work of Nordhaus (1975). Early studies in this literature explored the impact of elections on macroeconomic outcomes, such as growth and unemployment. The literature on PBCs evolved over time to investigate PBCs in economic policies (see Dubois 2016 for a comprehensive review). The literature focused on different policies, including electoral cycles in fiscal policy.[6] This strand of the literature examined electoral cycles in government spending, debt, budgets, or fiscal deficits, with supportive evidence on the presence of electoral cycles in these policy variables (see, for instance, Alesina et al. 1992, Drazen 2000, Schuknecht 2000, Brander and Drazen 2005, Shi and Svensson 2006, Ehrhart 2013, Alesina and Passalacqua 2016, and Lami and Imami 2019).

A relatively limited strand of this literature explored the effects of elections on tax policy changes.[7] Some studies examined electoral cycles in tax reforms at the local level focusing on different types of taxes (Foremny and Riedel 2014, Alesina and Paradisi 2017). Fuest et al. (2021) and David and Sever (2022) instead focused on electoral cycles in tax reforms in a cross-country setting. The former uses annual data and shows that governments tend to increase taxes in the post-election year, but it finds that neither the election year nor the pre-election year have a pronounced effect on tax reforms. The latter employs monthly data to capture the short-lived nature of electoral cycles in tax reforms. It shows that governments become less likely to announce tax reforms before elections, whereas they do so more frequently following elections. This paper contributes to these studies on electoral cycles in tax policy by examining whether the timing of elections affects the pace of implementation of tax policy changes, and in turn, the likelihood of tax news shocks. To the best of our knowledge, our paper is the first exploring the role of the timing of elections in tax news shocks.

Another significant contribution of the present paper to the literature on PBCs is the use of data at a monthly frequency by manually collecting data on election dates. Higher frequency data improves identification by enabling us to control for the effects of all other developments (such as economic and institutional factors), or shocks, on tax news shocks at the country-year level, and also at the month level. In this regard, this paper is one of the first studies investigating electoral cycles in general at monthly frequency in a cross-country setting. Other papers using monthly data include Aidt et al. (2020) and David and Sever (2022) who examined electoral cycles in money expansion and tax reforms, respectively.

Finally, this paper adds to the literature on unanticipated changes in tax policy as discussed above. This literature mainly explored the effects of unanticipated tax policy changes on macroeconomic outcomes, pointing to the importance of the fiscal foresight and policy uncertainty channels. To the best of our knowledge, there is no study on the determinants of those policy surprises. This paper presents strong evidence on a political economy determinant (i.e., the timing of elections) of tax news shocks. It also shows that various economic and institutional factors do not seem to affect the likelihood of tax reforms.

[6] Some studies also focused on electoral cycles in other types of economic policies, including monetary expansions and macroprudential policies, (e.g., Aidt et al. 2020, Sever and Yücel 2022).

[7] It is also important to note that some studies focused on this relationship by exploring how tax policy changes affect political outcomes. For instance, Chen et al. (2019) show that fiscal consolidations based on tax reforms lower the re-election probability of incumbent politicians.

The remainder of this paper is organized as follows. Section 2 introduces the data and illustrates the stylized facts. Section 3 explains the empirical strategy. Section 4 shows and discusses the findings. Finally, Section 5 concludes.

2. Data and Stylized Facts

2.1. Tax Policy Changes

It is crucial for this study to have information on the implementation lags for the announced tax policy changes (the time duration from the announcement to the implementation date). We categorize the cases in which the announcements lead to anticipated versus unanticipated tax policy changes, with the latter being deemed as "tax news shocks". For this purpose, we adopt a commonly used approach in the literature (Mertens and Ravn 2011, 2012, 2014, Ramey 2016), where a tax news shock is identified whenever the time gap between the policy announcement and implementation dates is shorter than 90 days. Based on this definition, we construct a monthly dummy variable for tax news shocks. It takes the value of 1 for a given month in a country, if there is at least one announcement during that month which has a shorter-than-90-days implementation lag, and 0 otherwise. We follow the same procedure for policy changes in general (including both tax increases and decreases), as well as tax increases and decreases separately. We measure tax news shocks at the date of announcement, since our focus is the behavior of the government, rather than the macroeconomic effects of the implemented policy changes. In this context, the announcement date is useful to understand the motivation of election-concerned politicians, due to that promises of policy changes can affect their popularity, and in turn, electoral success.

Data on tax policy changes come from the most recent version of the TPRD. The database was constructed by Amaglobeli et al. (2018) based on more than 950 OECD Economic Surveys and 53,000 tax related documents from the archives of IBFD extracted by text mining techniques.[8] The TPRD is a rich source for cross-country tax policy actions going back to decades. It provides detailed information on tax policy changes, covering both changes in the tax base and tax rates, as well as types of taxes: corporate income tax (CIT), personal income tax (PIT), value-added and sale taxes (VAT), social security contributions (SSC), excise tax (EXE), and property tax (PRO). It also includes information on the direction, the dates for the announcement and implementation, and the economic significance of those changes ("major" or "minor").

The countries included in the database are: Australia, Austria, Brazil, Canada, China, Czechia, Denmark, France, Greece, Germany, India, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Poland, Portugal, Spain, Turkiye, United Kingdom, and the United States.[9] We restrict the analysis to the period of 1990-2018, since the database has the most comprehensive coverage in terms of the dates during this time span (Amaglobeli et al. 2018, 2022).

Crucially for the context of this study, the database includes the date for the announcement and implementation of a particular tax policy change, with the exact days being available for the majority of such

[8] The database is available at tprdportal.org. See Amaglobeli et al. (2018, 2022) for a detailed description of the TPRD.
[9] We drop China from the sample of the analysis due to the peculiarities of its electoral system.

events.[10] Therefore, we are able to obtain the number of days from the announcement to the implementation of tax policy changes, which helps us identify tax news shocks, as described above.

Moreover, this feature of the TPRD allows us to employ our regression analysis at a monthly frequency, in contrast to the vast majority of the literature focusing on political business cycles in a cross-country setting which uses annual data. There are various advantages of our higher frequency data approach. First, to the extent that the impact of election periods on the probability of tax news shocks shifts quickly during the months before and after elections, the use of annual data masks political cycles, since the effects of pre- and post-election months would cancel out (Akhmedov and Zhruavskaya 2004). Therefore, in our analysis on the tax news shocks, monthly data enables us to capture the effects of elections on the likelihood of such events in a more clear-cut way. Next, the use of monthly data improves the identification by mitigating concerns about omitted variables. First, we absorb the effects of all economic and institutional variables on the likelihood of tax news shocks at the country-year level (through the inclusion of country-year fixed effects). Second, we control for the role of all global developments or shocks in the probability of those shocks at the monthly frequency. Finally, we argue that tax policy change announcements are unlikely to drive elections in the period that we focus on, whereas we also explicitly confirm such reverse causality does not drive our results.

In the analysis, we employ data of tax policy change announcements that are identified as “major”, in line with the literature (Amaglobeli et al. 2018, Gechert and Grob 2019, David and Sever 2022). The TPRD identifies a policy change as major, if the change is larger than 1 percentage point in the case of rate changes; and in the case of base changes, if the broadening in the tax base likely affects a large group or has large potential for mobilizing new resources.[11]

In our sample, there are 2,736 tax policy change announcements classified as major. 1,616 of them have information on both the date of the announcement and implementation, allowing us to calculate implementation lags. Out of those with the data on implementation lags, 141 of them were implemented retroactively, leading to negative implementation lags. Ignoring those cases,[12] we are able to utilize data from 54 percent of all tax policy change announcements in the dataset (1,475 events out of 2,736).[13] Looking at the direction of the policy change announcements, 594 (881) of those 1,475 cases are related to tax increase (decrease) announcements. The median implementation lag for those announcements is 99 days, whereas the average lag is 192 days. Out of 1,475 announcements, 671 of them have an implementation lag shorter than 90 days, thereby leading to tax news shocks according to our baseline definition above.

[10] The TPRD mainly reports the date in which the policy measure was announced officially by representatives of the government, including approval by the Cabinet of Ministers, presentation to Parliament and official speeches by the President or the Minister of Finance. We note that, given this restriction in the TPRD regarding the announcement dates, identifying tax news shocks based on the official announcements may be viewed as a caveat for some cases in which particularly long discussions about the change in tax policy take place even before the official announcement.

[11] An advantage of restricting the sample to “major” tax changes in our context is that implementation of minor tax changes may be less complex, or less challenging, compared to major changes. Therefore, instead of mixing minor and major changes in our analysis, it is sensible to focus on a more homogenous and economically meaningful sample of relatively large tax policy changes.

[12] We ignore the cases in which tax policy changes are implemented retroactively, since we focus on the behavior of governments regarding how fast they act to implement the policy changes that are announced around elections. However, we confirm that the results throughout the paper are robust to accounting for those cases as well.

[13] We think that it is reasonable to assume that the availability of information in the TPRD regarding the implementation dates for tax policy changes should not be systematically related to the implementation duration, and thus, the selection of events used in our sample is likely to be random.

In robustness checks, we also consider various alternative approaches to identify tax news shocks. Firstly, we examine if the results are robust, when we define tax news shocks using a shorter or longer time window to make sure that the specific time threshold does not drive the findings. In particular, we construct dummy variables whenever the implementation lag is shorter than 30, 60 and 120 days, instead of the 90-day threshold. Subsequently, we adopt an alternative definition where we identify tax news shocks whenever the implementation lag is below the sample median (99 days).

In addition, we tackle the issue of multiple announcements in a country for a given month. As an alternative to the baseline measure, we construct a dummy variable defining tax news shocks based on the average of the implementation lags of all announcements in a country made during a month. Whenever this average is shorter than 90 days, we assign the dummy variable for tax news shocks 1, and 0 otherwise. As another alternative way to account for the multiple shocks in a given month, we also use the number of tax news shocks in a country per month, instead of the dummy variable approach, as a robustness check.

2.2. Elections

We collect the data on the months of elections manually for 22 countries over the period of 1990-2018 from online resources. In this regard, it is important to use judgement to identify the type of elections that is more likely to affect policy decisions. This indeed depends on the prevailing political system and the political power of the chief executives. In presidential systems such as the United States, where the president has greater political power (and possible more incentive), to change policies, e.g., with re-election concerns, we adopt presidential elections. For parliamentary systems such as Germany, we use parliamentary elections. Whenever it is available and applicable, we also cross-check our data with various other well-known datasets, including the Comparative Political Data Set by Armingeon et al. (2022). The Appendix (Table A.1) provides the months of elections in the sample period.

2.3. Other Variables

In robustness checks, we also control for possible effects of various country-specific factors on the likelihood of tax news shocks to alleviate concerns about omitted variables. While the inclusion of fixed effects absorbs the effects of all factors on the likelihood of tax news shocks at the country-year frequency, as well as the impact of common monthly shocks, there may still be other important drivers changing at the country-month level that can affect the results. In this context, we first consider a proxy for institutional capacity (or constraints) to implement the announced tax policy changes. Although, such institutional factors tend not to change very often, and therefore their effects on the likelihood of tax news shocks are mostly soaked by country-year fixed effects, we include the index on bureaucratic quality (which contains some variation at a monthly frequency), from the International Country Risk Guide (ICRG) database by the Political Risk Services Group, as a proxy indicator for institutional factors. It is a measure of the institutional strength and quality of the bureaucracy assessing the extent of expertise to manage policy changes and daily administrative functions, as well as the presence of autonomous mechanisms for recruitment and training. The index ranges between 0 and 4. We also use the index on law and order (ranging between 0 and 6) from the same database representing the strength of the legal system and an assessment of popular observance of the law, as a broader proxy for institutional quality. These indexes are constructed based on experts' assessments, with higher values indicating stronger

institutions. Given the monthly indexes from the ICRG database, we are able to control for, if any, such frequent changes in the institutional environment.

Moreover, we add two variables as proxies for economic activity and inflation, since economic factors that change at monthly frequency may also have an influence on how fast governments act to implement the announced tax policy changes. More specifically, we use the change on the industrial production index (year-on-year basis), adopted from the IMF's International Financial Statistics (IFS) database. We also obtain inflation (based on consumer prices, year-on-year change) from the same database.

2.4. Stylized Facts

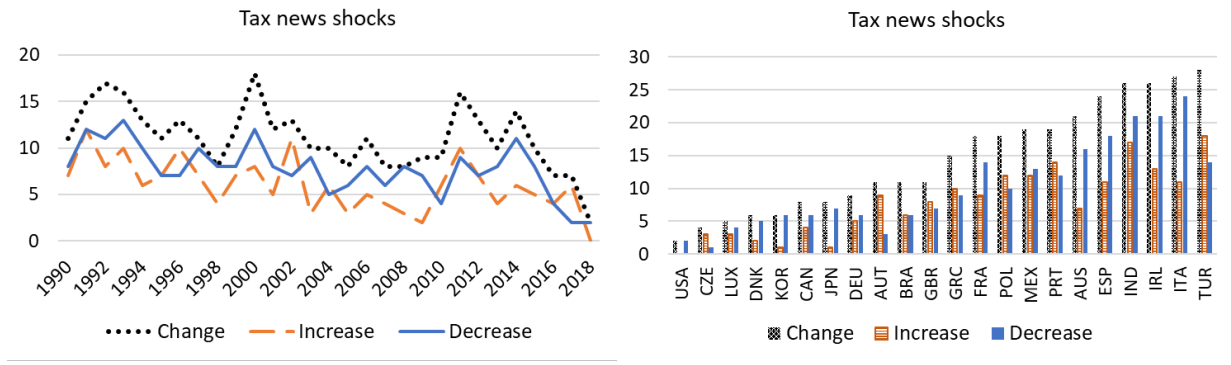
2.4.1. Events in the Sample

The sample consists of monthly data from 22 AEs and EMs over the period of 1990-2018. The number of country-month observations is 7,656. The total number of country-month observations with tax news shocks related to tax policy changes (encompassing both tax increases and decreases) is 322. Therefore, the average monthly probability of tax news shocks regarding tax policy changes is 4.2 percent in the sample. To put this number into a context, an average country in the sample faces a tax news shock in each 2 years (more precisely, in each 23.8 months). The total number of country-month observations with tax news shocks related to tax increases (decreases) is 176 (225), making the average monthly probability 2.3 (2.9) percent.

The left-hand side chart in Figure 1 documents the number of tax news shocks related to: (i) all tax policy changes (i.e., both increase and decreases), (ii) tax increases, and (iii) tax decreases for each year in the sample. There are multiple shocks in the sample each year. However, there is a notable decrease in the prevalence of tax news shocks in the last few years.

The right-hand side chart in Figure 1 reports the news shocks for all tax changes, tax increases and tax decreases for each country over the sample period. It is worthwhile to note that the number of shocks differs across countries. For instance, the US had the lower number of shocks related to tax policy changes, whereas Turkiye had the highest number of such episodes. To mitigate concerns about the distribution of the shocks across the years or the countries in the sample, we employ robustness checks using relevant subsamples (to be discussed later).

Figure 1. Tax news shocks in the sample



Notes: The left-hand side chart reports the number of country-month observations with tax news shocks in the sample. The dotted black line represents the shocks regarding all tax policy changes (encompassing both tax increases and decreases) per year. The dashed orange (solid blue) line illustrates the number of country-month observations with tax news shocks related to tax increases (decreases) per year. The right-hand side chart reports the tax news shocks for each country in the sample. The dotted black, dashed orange and solid blue bars display the total number of tax news shock related to all tax changes, tax increases and tax decreases, respectively.

2.4.2. Tax News Shocks and Election Periods

We also illustrate various stylized facts on the interplay between the likelihood of tax news shocks and election periods. Figure 2 documents the findings. The first set of bars in the left-hand side chart in Figure 2 shows that the average monthly probability of tax news shocks related to all tax policy changes (including both tax increase and decrease announcements) is 4.2 percent (dotted gray bar). The solid blue bar displays this probability during the 12-month period before elections, which is 3.3 percent. The dashed green bar shows that the probability of tax news shocks for the announcements that are made within the 12-month period after elections is much larger (5.8 percent). These suggest that tax news shocks in general become less likely before elections, whereas they tend to be more frequent in the aftermath of elections.

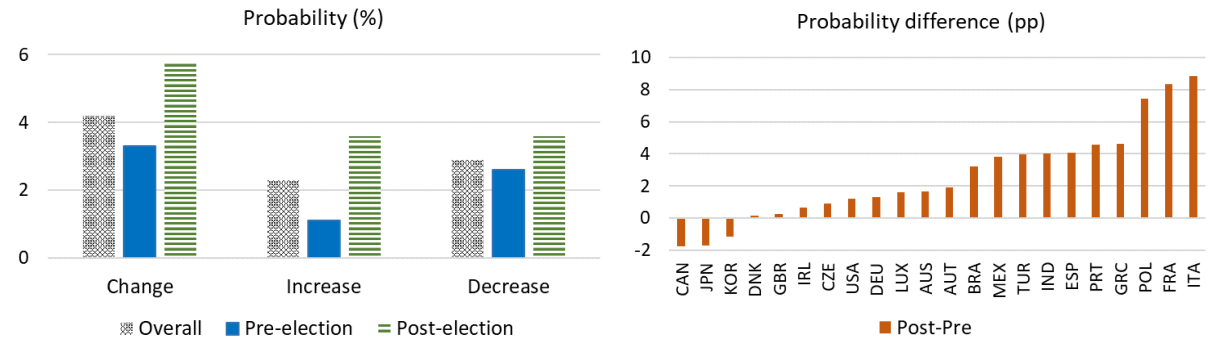
We then explore whether this pattern is also present when tax increases and decreases are considered separately. The second set of bars in the left-hand side chart in Figure 2 employs the same analysis using the tax news shocks defined based on tax increases exclusively. We observe a similar pattern to the one for all tax changes. The average monthly probability of such shocks in the overall sample is 2.3 percent, whereas it seems to be lower in the pre-election periods (1.1 percent), but higher for the announcements that are made after the elections (3.6 percent). Finally, the third set of bars in the left-hand side chart in Figure 2 shows the average monthly probability of tax news shocks related to tax decreases exclusively is 2.9 percent in the overall sample, and it is marginally lower in the pre-election months (2.6. percent), whereas it becomes larger following the elections (3.6 percent).

We conclude that there appears to be a relationship between the likelihood of tax news shocks occurring and election periods: Tax news shocks (based on all tax policy changes) become less likely before elections, whereas they tend to be more frequent following elections. The lower likelihood during the pre-

election period is particularly visible for the announcements of tax increases, and it seems to be somewhat less pronounced for the case of pre-election tax decreases.[14]

The right-hand side chart in Figure 2 explores the difference in the probability of tax news shocks (based on all tax policy changes) across post- and pre-election periods in each country. It shows that this gap is positive in 19 countries out 22 in the sample, meaning that the probability of tax news shocks is larger in the post-election period relative to the pre-election period for those countries. Thus, it appears that the patterns shown by the left-hand side chart in Figure 2 are indeed wide-spread across countries. These findings suggest that governments are likely to act relatively slowly to implement tax policy changes that are announced before elections. However, they tend to implement the ones that are announced after elections much quicker. Motivated by these observations, we examine the change in the probability of tax reforms within election periods in a more formal setup.

Figure 2. Probability of tax news shocks around elections



Notes: The left-hand side chart reports the average monthly probability of tax news shocks (in percent) in the overall sample, and during the 12-month periods before and after elections. The dotted gray bar illustrates the probability of tax news shocks in the overall sample. The blue (dashed green) bar represents the probability of tax news shocks during the pre-election (post-election) periods. The right-hand side chart reports the difference in the average monthly probability of tax news shocks (encompassing all changes) in the 12-month periods after and before elections for each country in the sample (in percentage points, pp). We note that the pre-election period includes 12 months running up to the elections and the election month as with the regression analysis below.

3. Empirical Strategy

Our goal is to examine whether the likelihood of tax news shocks differs for the tax policy changes that are announced before and after elections, compared to other periods. For this purpose, we adopt a panel linear probability model with fixed effects. The main specification is as follows:

$$Probability\left(Tax\ News\ Shocks_{c,t}\right) = \mu + \beta\ Election\ window_{c,t} + \theta_{c,y} + \theta_t + \epsilon_{c,t} \quad (1)$$

where c and t stand for country and month, respectively. The dependent variable $Probability\left(Tax\ News\ Shocks_{c,t}\right)$ is a dummy variable which takes one whenever there is a tax news shock in

[14] The distribution of the implementation lags around election periods also points to a similar fact, as shown in the Appendix.

a given month, and 0 otherwise. It is measured at the date of announcement. In different regressions, it is defined based on the announcements of tax policy changes (including increase and decrease announcements), as well as tax increases and decreases. The right-hand side variable $Election\ window_{c,t}$ is a dummy indicating the 12-month periods before or after elections in separate regressions. For pre-election, it is assigned 1 during the 12-month period running up to the elections and the month of elections, and 0 otherwise. For post-election, it is 1 during the 12-month period following the elections, and 0 otherwise. We also do the analysis using 6-month windows around elections.

A major advantage of using monthly data is that it allows us to include country-year ($\theta_{c,y}$) and month (θ_t) fixed effects. Thus, we are able to control for the effects of all (i) macroeconomic and other variables that change at country-year level and (ii) monthly shocks or developments that are common across countries on the probability of tax news shocks. Those fixed effects mitigate possible concerns about omitted variables. In this regard, it is worthwhile to mention that some countries may have less institutional strength or weaker governance leading longer implement lags for the announced tax policy changes, thereby affecting the occurrence of tax news shocks. To the extent that the institutional environment in a given country does not drastically change at monthly frequency, country-year fixed effects would absorb the impact of such factors on the likelihood of tax news shocks. Moreover, the use of monthly (rather than annual) data enables us to observe the effect of election periods on the probability of tax news shocks in a more clear-cut way before and after elections, as discussed previously.

Our identification strategy also relies on the assumption that elections dates are mostly pre-determined, and it is unlikely that a tax news shock would lead to elections in a 12-month window (as also confirmed later). Standard errors are clustered at the country-year level. We also employ various robustness checks to confirm neither the inclusion of fixed effects nor the clustering of standard errors drives the results, as described below.

In this specification, β captures the effect of different periods around elections on the likelihood of tax news shocks. If the coefficient estimate β turns out to be negative (positive) in the case of a specific period, it implies that governments likely act at a lower (higher) pace to implement tax policy changes that are announced during that time window, relative to how fast they implement the announced policy changes in other times. Based on the stylized facts as shown by Figure 2, we expect the coefficient estimate β to be negative in the case of pre-election periods, whereas it should be positive for the post-election periods, implying an increased (decreased) probability of tax news shocks during pre-election (post-election) months.

4. Results

4.1. Main Results

Table 1 illustrates the main findings. Columns 1-3 (columns 4-6) focus on the pre-election (post-election) period within the 12-month window. Columns 1 and 4 consider news shocks encompassing all tax policy changes including the announcements of both tax increases and decreases. Columns 2 and 5 (columns 3 and 6) define tax news shocks based on tax increases (decreases), exclusively.

The results suggest that the average monthly probability of tax news shocks encompassing all tax change announcements declines by 2.6 pp in the pre-election period (column 1). This is economically important, since the average monthly probability of those events in the sample is 4.2 percent, as mentioned before. Columns 2 and 3 illustrate that this lower probability is driven by the decreased likelihood of tax news shocks related to both tax increases and decreases. The average monthly probability of tax news shocks related to tax increase announcements becomes 2.4 pp lower in the pre-election period. This is large, considering that the average monthly probability of these events in the sample is 2.3 percent. Column 3 shows that the average monthly probability for tax news shocks related to tax decrease announcements turns out to be 1.6 pp lower for the pre-election announcements. This is also sizable given that the average probability of such events is 2.9 percent in the overall sample. These imply that governments tend to implement tax policy change announcements at a relatively slower pace before elections (for both tax increases and decreases), thereby making tax news shocks less likely in the pre-election period.

Focusing on the post-election months, column 4 in Table 1 shows that tax news shocks for all tax policy changes become more likely for the announcements that are made post-election. The average monthly probability of such shocks increases by 3.0 pp in the first 12-months following elections. Looking into the direction of policy changes, tax news shocks regarding both tax increases (column 5) and decreases (column 6) turn out to be more likely following elections. We conclude that governments tend to act at a relatively faster pace to implement tax policy changes (for both tax increases and decreases) that are made after elections, thereby making tax news shocks more frequent in the aftermath of elections.

These patterns are consistent with the facts displayed by Figure 2. These findings also suggest that it is important to use high-frequency data to capture the relationship between the timing of elections and tax news shocks, since the change in the probability of such events shifts in the months before and after elections.

Table 1. Tax news shocks 12-month window around elections

Variable	Pre-election 12-month period			Post-election 12-month period		
	Change	Increase	Decrease	Change	Increase	Decrease
Election window	-0.026***	-0.024***	-0.016**	0.030***	0.023***	0.018**
	(0.009)	(0.007)	(0.008)	(0.009)	(0.007)	(0.008)
Country-year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7656	7656	7656	7656	7656	7656
R-squared	0.146	0.144	0.145	0.146	0.144	0.146

Notes: The results are based on equation 1. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock (where the period between the announcement and implementation dates is shorter than 90 days), and 0 otherwise. Columns 1 and 4 consider tax news shocks for all tax changes. Columns 2 and 5 (3 and 6) consider tax news shocks for the tax increases (decreases), exclusively. In columns 1-3, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 4-6, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

Table 2 presents the results focusing on a narrower time window around elections, i.e., a 6-month period, instead of a 12-month period. The patterns remain broadly similar to the ones reported in Table 1. We use the 12-month window for the rest of the analysis.

Table 2. Tax news shocks 6-month window around elections

Variable	Pre-election 6-month period			Post-election 6-month period		
	Change	Increase	Decrease	Change	Increase	Decrease
Election window	-0.022***	-0.023***	-0.006	0.019**	0.013*	0.017**
	(0.009)	(0.006)	(0.008)	(0.010)	(0.007)	(0.008)
Country-year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7656	7656	7656	7656	7656	7656
R-squared	0.145	0.143	0.145	0.145	0.142	0.145

Notes: The results are based on equation 1. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock (where the period between the announcement and implementation dates is shorter than 90 days), and 0 otherwise. Columns 1 and 4 consider tax news shocks for all tax changes. Columns 2 and 5 (3 and 6) consider tax news shocks for tax increases (decreases), exclusively. In columns 1-3, the election window dummy variable takes the value of 1 for the 6-month period before elections and the election months, and 0 otherwise. In columns 4-6, it is 1 for the 6-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

4.2. Alternative Definitions of Tax News Shocks

We start by testing the robustness of the results to the definition of tax news shocks. First, we account for multiple announcements during a given month. In the analysis above, we assign the dummy variable for tax news shocks a value of 1, when at least one of the tax policy changes announced in a month is associated with an implementation lag that is shorter than the threshold. However, there are cases of multiple tax policy change announcements for the country-month pairs in the sample. To account for those, we adopt an alternative approach such that, whenever there are multiple announcements in a given month, we calculate the average of the implementation lags for those announcements and identify a policy change as a tax news shock, if that average lag is smaller than 90 days. It is, however, worth noting that a possible caveat of this analysis is that exceptionally long implementation lags related to a small number of announcements could affect these results. Table 3 documents the results. It shows that the previous findings remain valid, but the effect of elections periods on the likelihood of tax news shocks regarding tax decreases becomes less pronounced.

Table 3. Tax news shocks based on the average implementation lag

Variable	Pre-election 12-month period			Post-election 12-month period		
	Change	Increase	Decrease	Change	Increase	Decrease
Election window	-0.021**	-0.017***	-0.005	0.023***	0.015***	0.009
	(0.009)	(0.006)	(0.006)	(0.009)	(0.006)	(0.006)
Country-year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7656	7656	7656	7656	7656	7656
R-squared	0.151	0.143	0.140	0.152	0.143	0.140

Notes: The results are based on equation 1. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock (where the average of the periods between the announcement and implementation dates is shorter than 90 days in the case of multiple announcements), and 0 otherwise. Columns 1 and 4 consider tax news shocks for all tax changes. Columns 2 and 5 (3 and 6) consider tax news shock for tax increases (decreases), exclusively. In columns 1-3, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 4-6, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

An alternative way of accounting for multiple announcements in a given month is to adopt the number of tax news shocks per month as the dependent variable, instead of a dummy variable approach. Table 4 presents the results using this approach. It shows that results remain similar to the ones reported previously, except for a less pronounced pattern regarding tax news shocks linked to tax decreases.

Table 4. Analysis based on the number of tax news shocks

Variable	Pre-election 12-month period			Post-election 12-month period		
	Change	Increase	Decrease	Change	Increase	Decrease
Election window	-0.062**	-0.051***	-0.012	0.056**	0.040***	0.016
	(0.026)	(0.013)	(0.017)	(0.024)	(0.015)	(0.015)
Country-year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7656	7656	7656	7656	7656	7656
R-squared	0.140	0.142	0.134	0.140	0.141	0.134

Notes: The results are based on equation 1. The dependent variable is the number of tax news shock (reflecting the number of the announcements where the period between the announcement and implementation dates is shorter than 90 days), and 0 otherwise. Columns 1 and 4 considers tax news shocks for all tax changes. Columns 2 and 5 (3 and 6) consider tax news shocks for tax increases (decreases), exclusively. In columns 1-3, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 4-6, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

Next, we perform a set of tests to make sure that the specific threshold used to define tax news shocks does not drive the findings. For this purpose, we use different time windows to categorize tax news shocks by abbreviating and extending the previously used 90-day limit. In particular, we examine the results using the thresholds of 30, 60 and 120 days to identify tax news shocks. Table 5, Table 6, and Table 7 illustrate the findings. In Table 8, we instead use the median value of the implementation lags across the sample (99 days) to identify tax news shocks. Overall, the findings are similar across these different thresholds, and in line with the main results reported before.

Table 5. Defining tax news shocks based on a 1-month threshold

Variable	Pre-election 12-month period			Post-election 12-month period		
	Change	Increase	Decrease	Change	Increase	Decrease
Election window	-0.018***	-0.012***	-0.013**	0.017***	0.011**	0.008
	(0.006)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)
Country-year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7656	7656	7656	7656	7656	7656
R-squared	0.153	0.147	0.150	0.153	0.147	0.150

Notes: The results are based on equation 1. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock (where the period between the announcement and implementation dates is shorter than 30 days), and 0 otherwise. Columns 1 and 4 consider tax news shocks for all tax changes. Columns 2 and 5 (3 and 6) consider tax news shock for tax increases (decreases), exclusively. In columns 1-3, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 4-6, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

Table 6. Defining tax news shocks based on a 2-month threshold

Variable	Pre-election 12-month period			Post-election 12-month period		
	Change	Increase	Decrease	Change	Increase	Decrease
Election window	-0.022***	-0.017***	-0.017**	0.024***	0.015**	0.015**
	(0.008)	(0.006)	(0.007)	(0.008)	(0.007)	(0.007)
Country-year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7656	7656	7656	7656	7656	7656
R-squared	0.145	0.141	0.146	0.145	0.141	0.146

Notes: The results are based on equation 1. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock (where the period between the announcement and implementation dates is shorter than 60 days), and 0 otherwise. Columns 1 and 4 consider tax news shocks for all tax changes. Columns 2 and 5 (3 and 6) consider tax news shock for tax increases (decreases), exclusively. In columns 1-3, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 4-6, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

Table 7. Defining tax news shocks based on a 4-month threshold

Variable	Pre-election 12-month period			Post-election 12-month period		
	Change	Increase	Decrease	Change	Increase	Decrease
Election window	-0.028***	-0.027***	-0.017**	0.031***	0.026***	0.016**
	(0.010)	(0.008)	(0.008)	(0.010)	(0.008)	(0.008)
Country-year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7656	7656	7656	7656	7656	7656
R-squared	0.143	0.147	0.140	0.143	0.147	0.140

Notes: The results are based on equation 1. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock (where the period between the announcement and implementation dates is shorter than 120 days), and 0 otherwise. Columns 1 and 4 consider tax news shocks for all tax changes. Columns 2 and 5 (3 and 6) consider tax news shock for tax increases (decreases), exclusively. In columns 1-3, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 4-6, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

Table 8. Defining tax news shocks based on the sample median

Variable	Pre-election 12-month period			Post-election 12-month period		
	Change	Increase	Decrease	Change	Increase	Decrease
Election window	-0.031***	-0.027***	-0.019**	0.034***	0.025***	0.021***
	(0.010)	(0.007)	(0.008)	(0.010)	(0.007)	(0.008)
Country-year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7656	7656	7656	7656	7656	7656
R-squared	0.144	0.144	0.143	0.144	0.144	0.144

Notes: The results are based on equation 1. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock (where the period between the announcement and implementation dates is shorter than the sample median, 99 days), and 0 otherwise. Columns 1 and 4 consider tax news shocks for all tax changes. Columns 2 and 5 (3 and 6) consider tax news shock for tax increases (decreases), exclusively. In columns 1-3, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 4-6, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

4.3. Other Robustness Checks

We also examine the robustness of the results to a large set of additional checks. First, although fixed effects in the regressions soak the effects of all institutional and economic variables that change at the country-year level, as well as the month shocks that are common across countries, on the likelihood of tax news shocks, there may still be an omitted variable bias concern about the role of the country-level factors that change at a monthly frequency. To mitigate this issue, we add several control variables to the main specification, namely the lagged values of a proxy for institutional strength (the ICRG index on bureaucratic quality), a proxy for economic activity (the industrial production index), and inflation. Table 9 presents the findings.

To start with, countries may differ regarding their institutional capacity or constraints to implement the announced tax policy changes. This can affect the duration of implementation of policy changes, thereby affecting the occurrence of tax news shocks. In this context, this set of robustness checks controls for the effects of monthly variation in institutional strength by including the ICRG index on bureaucratic quality. Table 9 shows that previous results remain valid, while the proxy for monthly institutional developments does not seem to be a statistically significant impact of the occurring of tax news shocks. We also note that the results stay similar if the ICRG index on law and order is used as a proxy for broader institutional quality, instead of the index on bureaucratic quality. There are two possible explanations for the statistically insignificant coefficients of our proxies for the institutional environment. First, as discussed, the role of long-standing institutional factors is likely to have been absorbed by country-year fixed effects, as monthly variation in these variables is limited. The second explanation is related to our sample, which does not include developing economies. Therefore the cross-country variations of these institutional factors is likely to be somewhat limited. In this regard, it may be interesting to test the implications of institutional factors on the likelihood of tax news shocks in broader samples, as the data on tax policy changes become available.

Next, economic developments, in particular those regarding economic activity and inflation, may affect how fast governments act to implement the announced policy changes. Therefore, it is important to check whether our main result on the role of election periods in the likelihood of tax news shocks survives, once we

also account for these factors. In addition, the examination of the role of those economic factors on the probability of tax news shocks is itself of interest and has not been carefully analyzed in the literature. Table 9 shows that the main results remain similar, nonetheless these economic variables do not seem to affect the likelihood of tax news shocks occurring. Moreover, in unreported results, we further investigate the potential role of these economic variables on the likelihood of tax news shocks by conducting additional tests, such as controlling for one- or two-year lagged values of those variables, or their average of the past 12 months. The results are broadly similar and available upon request. These findings suggest that electoral cycles appear to be more important than the economic developments considered in predicting tax news shocks. Finally, we note that the findings in Table 9 remain unchanged if these control variables are added separately, one at a time.[15]

Table 9. Controlling for several factors

Variable	Pre-election 12-month period			Post-election 12-month period		
	Change	Increase	Decrease	Change	Increase	Decrease
Election window	-0.030***	-0.027***	-0.017**	0.031***	0.021***	0.021**
	(0.010)	(0.007)	(0.008)	(0.010)	(0.007)	(0.008)
Institutional strength	0.003	-0.011	0.001	0.007	-0.008	0.003
	(0.042)	(0.044)	(0.045)	(0.043)	(0.044)	(0.045)
Economic activity	-0.000	-0.000	-0.001	-0.000	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inflation	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country-year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6676	6676	6676	6676	6676	6676
R-squared	0.155	0.152	0.156	0.155	0.151	0.156

Notes: The results are based on equation 1. It adds the lagged values of the index on bureaucratic quality, the change of the industrial production index, and inflation to the main specification. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock (where the period between the announcement and implementation dates is shorter than 90 days), and 0 otherwise. Columns 1 and 4 consider tax news shocks for all tax changes. Columns 2 and 5 (3 and 6) consider tax news shocks for tax increases (decreases), exclusively. In columns 1-3, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 4-6, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

We also check whether the results change, when we control for the number of tax policy change announcements in each month. In this regard, this set of tests asks a slightly different question, i.e., whether election periods affect the probability of tax news shocks on top of their possible impact on the occurrence of tax policy change announcements (regardless of whether they are anticipated or not). We note that these regressions are very demanding in the sense that tax news shocks are a subset of tax policy change announcements. In particular, more than 40 percent of all announcements are associated with tax news shocks in the monthly data, making the control variable and the dependent variable highly correlated. However, Table 10 shows that the findings on the effects of election periods on the likelihood of tax news shocks survive these

[15] We also test the possibility of omitted variables bias based on the approach proposed by Oster (2019). The results suggest that our findings are unlikely to be driven by omitted factors. In particular, Oster's delta is greater than 1 (i.e., in the range of 5-24) for all regressions (except the one on the likelihood of tax news shocks related to tax decreases in the pre-election period), which is reassuring.

checks. This indicates that the previous findings on the role of electoral cycles in tax news shocks are not solely driven by possible effects of the timing of elections on the occurring of tax policy change announcements. As could be expected, however, the positive and statistically significant coefficient estimates of the number of announcements (for each type of policy change) suggest that the occurrence of those events increases the probability of tax news shocks to a large extent.

Table 10. Controlling for the number of announcements

Variable	Pre-election 12-month period			Post-election 12-month period		
	Change	Increase	Decrease	Change	Increase	Decrease
Election window	-0.012*	-0.008*	-0.012**	0.019***	0.009**	0.015**
	(0.007)	(0.005)	(0.006)	(0.007)	(0.005)	(0.006)
Announcements	0.126***	0.197***	0.155***	0.126***	0.197***	0.155***
	(0.009)	(0.020)	(0.013)	(0.009)	(0.020)	(0.013)
Country-year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7656	7656	7656	7656	7656	7656
R-squared	0.403	0.446	0.405	0.404	0.446	0.406

Notes: The results are based on equation 1. It adds the number of tax policy change announcements for each corresponding tax shock. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock (where the period between the announcement and implementation dates is shorter than 90 days), and 0 otherwise. Columns 1 and 4 consider tax news shocks for all tax changes. Columns 2 and 5 (3 and 6) consider tax news shock for tax increases (decreases), exclusively. In columns 1-3, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 4-6, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

In addition, we also aim to address potential concerns about using a linear model with the binary outcomes as the dependent variable. Therefore, we adopt a Probit model to estimate the relationship between election periods and the probability of the occurrence of tax news shocks. For this purpose, we apply analytical bias correction for the well-known incidental parameter problem for Probit models with fixed effects (Lancaster 2000, Cruz-Gonzalez et al 2017). Table 11 reports that the findings, which are in line with results presented previously.

Table 11. Probit model

Variable	Pre-election 12-month period			Post-election 12-month period		
	Change	Increase	Decrease	Change	Increase	Decrease
Election window	-0.089***	-0.209***	-0.078**	0.115***	0.285***	0.106**
	(0.025)	(0.038)	(0.036)	(0.032)	(0.055)	(0.045)
Country-year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1817	769	1085	1817	769	1085
Pseudo R-squared	0.116	0.135	0.112	0.118	0.142	0.114

Notes: The results are based on equation 1, but estimated using a Probit model. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock (where the period between the announcement and implementation dates is shorter than 90 days), and 0 otherwise. Columns 1 and 4 consider tax news shocks for all tax changes. Columns 2 and 5 (3 and 6) consider tax news shock for tax increases (decreases), exclusively. In columns 1-3, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 4-6, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. Average partial effects are reported. *** p<0.01, ** p<0.05, * p<0.1.

Our findings are also robust to various additional checks, which are not reported here to save space, but are available upon request. For instance, we also tried excluding a few countries with the highest and/or lowest number of shocks in the sample (as shown by Figure 1) in order to make sure that those countries do not drive the findings. In addition, we ran weighted regressions where the weights are real GDP or real GDP per capita (averaged over the sample period), or the inverse of those variables, in order to confirm that a few large/small or more/less developed economies are not the ones driving the results. Moreover, we dropped the last four years from the sample given that the number of shocks has a declining trend during that period, as illustrated by Figure 1. We also confirm that the results are similar when we restrict the analysis to later years (e.g., starting from the 2000s). Next, to address concerns about reverse causality (i.e., the timing of elections may be driven by tax news shocks), we removed a few snap elections from the sample and ran the analysis using data only from the elections with pre-determined dates. We also tried excluding all fixed effects, or replacing country-year fixed effects with country fixed effects, since they may be "over-controlling". We then employed the analysis with non-clustered standard errors. Finally, we ran a Logit model instead of Probit. The previous patterns stay unchanged across those tests.

4.4. Explanatory Power

In this section, we turn to the predictive power of election periods using the receiver operating characteristic (ROC) curve which is a widely used tool for the analysis with binary classification with the Probit model. It a representation of whether an empirical model is able to successfully identify positive cases (tax news shocks in our context) and also not to identify negative cases (no tax news shocks) across all signals.

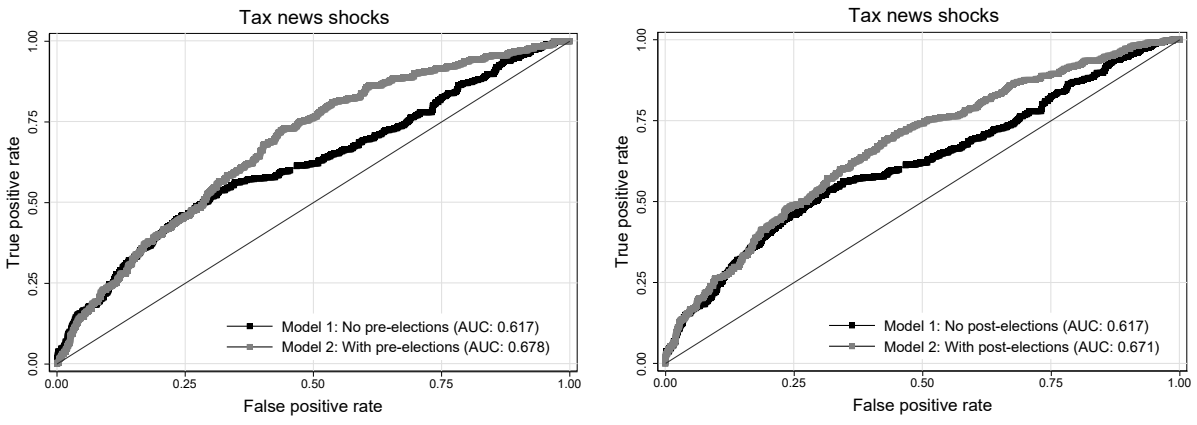
In Figure 3, the x-axis indicates the false positive rate, i.e., how often there is no tax news shock when the model predicts a shock. The y-axis is the true positive rate, showing how often the model predicts a shock when there exists a tax news shock in the data. For instance, a point in Figure 3 with true positive rate 0.50 and false positive rate 0.25 represents a threshold which predicts a shock when there is indeed a shock about 50 percent of the time, and also predicts a shock when there is no shock around 25 percent of the time. Thus, a ROC curve that is closer to the upper left corner of the box reflects a better goodness of fit for the empirical model. Quantitatively, the predictive power of the model is captured by the area under the curve (AUC). When

AUC is 0.5, the model is not informative, suggesting that it is equivalent to tossing a coin when predicting the occurrence of a tax news shocks (shown by the 45-degree line in Figure 3). Hence, an empirical model which is informative lies above the 45-degree line with an AUC value greater than 0.5. A model which perfectly predicts tax news shocks would have an AUC of 1.

We employ the analysis using tax news shocks that are defined based on all tax policy change announcements (encompassing both tax increases and decreases). The gray lines in Figure 3 show the goodness of fit based on the Probit model from the first and fourth columns in Table 11 (for pre- and post-election periods) on the left-hand and right-hand side charts, respectively. The black lines display that goodness of fit, when we use a Probit model by dropping the election window dummy, but only keeping the two sets of fixed effects. The figure shows that the AUC value of the model that only includes the fixed effects is 0.617 with a standard error of 0.018. Being statistically different than 0.5 at the 1 percent significance level, it suggests that fixed effects (by controlling for country-year characteristics and common month-shocks) add some predictive power for tax reforms, with the model performing significantly better than tossing a coin in predicting tax news shocks.

When we add the pre-election window dummy in line with equation 1, however, the AUC value increases to 0.678 with a standard error of 0.015 (the left-hand side chart in Figure 3). This means that the AUC value of the model with the 12-month pre-election dummy is statistically different (i) from 0.5 at the 1 percent significance level, and also (ii) from the model excluding the pre-election dummy at the 5 percent significance level. Then, we include the 12-month post-election window dummy, the AUC value increases to 0.670 with a standard error of 0.016 (the right-hand side chart in Figure 3). This suggests that the AUC value of the model with the post-election dummy in this case is statistically different (i) from 0.5 at the 1 percent significance level, and also (ii) from the model which excludes the post-election dummy at the 10 percent significance level. We conclude that although pre- and post-election periods are far from being perfect predictors, they are informative of tax news shocks in the data.

Figure 3. ROC curves



Notes: The figure illustrates the ROC curves of the models without and with the dummy variables indicating the election windows. The grey line in the left-hand side chart (right-hand side chart) represents the goodness of fit based on the Probit model as shown in the first (fourth) column in Table 11. The black lines represent the goodness of fit from the Probit model that excludes the election window dummy, but keeps the two sets of fixed effects. AUC is the area under the curve, ranging between 0 and 1.

4.5. Changes in the Tax Base versus Tax Rates

The complexity of the implementation of the announced tax policy changes may depend on whether those policies are related to a change in the tax base or tax rates. In this section, we explore whether such consideration may affect the results. In particular, we test if the previous patterns still hold for tax news shocks related to changes in the tax base and in tax rates. For this purpose, we define tax news shocks based on announcements of changes in the tax base and tax rates, separately. Table 12 shows the findings. The conclusions regarding the lower the probability of tax news shocks during pre-election and the higher probability following elections are still pronounced, and similar for announcements related to the changes in tax base and changes in tax rates, when changes related to both increases and decreases are considered. We however note that as we follow a more granular approach regarding the categories of tax news shocks, the events in the sample become sparser, posing a potential caveat for the interpretation of the results.[16]

Table 12. Changes in the tax base and tax rates

Variable	Pre-election 12-month period		Post-election 12-month period	
	Tax base	Tax rates	Tax base	Tax rates
Election window	-0.019**	-0.018***	0.018**	0.024***
	(0.008)	(0.007)	(0.008)	(0.007)
Country-year F.E.	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes
Observations	7656	7656	7656	7656
R-squared	0.143	0.140	0.143	0.141

Notes: The results are based on equation 1. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock regarding changes in the tax base or tax rates (where the period between the announcement and implementation dates is shorter than 90 days), and 0 otherwise. Columns 1 and 3 consider tax news shocks for the changes in the tax base (including broadening or narrowing announcements). Columns 2 and 4 consider tax news shocks for the changes in tax rates (including increases and decreases). In columns 1-2, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 3-4, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

4.6. Changes in Consumption versus Income Taxes

Another avenue to explore is whether elections have similar effects on various types of taxes. In practice, implementation duration may also depend on the type of tax being modified, since different types of taxes may impose different technical or political challenges at the implementation stage. For this purpose, we divide the tax types into two categories: (i) consumption taxes (comprising value added and sale taxes as well as excise taxes) and (ii) income taxes (comprising corporate and personal income taxes as well as social security contributions). We then examine the whether the findings still hold focusing on the changes in these subcategories. The results in Table 13 suggest that the previous patterns remain consistent for different tax

[16] That is, the average monthly probability of tax news shocks in each category becomes smaller as we focus on subcategories. The average monthly probability of tax news shocks related to the changes in the tax base (tax rates) is 3.1 percent (2.2 percent).

types as well. Similar to the analysis in Section 4.5 above, a potential caveat of going more granular regarding the types of taxes is that the events (tax news shocks) for each type become less frequent in the sample.[17]

Table 13. Changes in consumption and income taxes

Variable	Pre-election 12-month period		Post-election 12-month period	
	Consumption	Income	Consumption	Income
Election window	-0.010*	-0.021**	0.015***	0.021***
	(0.005)	(0.008)	(0.005)	(0.008)
Country-year F.E.	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes
Observations	7656	7656	7656	7656
R-squared	0.129	0.143	0.129	0.143

Notes: The results are based on equation 1. The dependent variable is a dummy which takes the value of one in the months during which there is a tax news shock regarding changes in the consumption and income taxes (where the period between the announcement and implementation dates is shorter than 90 days), and 0 otherwise. Columns 1 and 3 consider tax news shocks for the changes in consumption taxes (VAT and EXE). Columns 2 and 4 consider tax news shocks for the changes in income taxes (CIT, PIT and SSC). In columns 1-2, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 3-4, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

4.7. Advanced Economies versus Emerging Markets

Finally, we examine whether the main results presented above vary across AEs and EMs. Table 14 presents the results. The previous findings are confirmed in the subsample of AEs. Nevertheless, although the pre-election pattern for tax news shocks remains similar in EMs, interestingly, for this set of countries, we do not observe a significantly higher probability of post-election tax news shocks.

[17] We note that the average monthly probability of tax news shocks related to the changes in consumption taxes (income taxes) is 1.2 percent (3.2 percent).

Table 14. Advanced economies versus emerging markets

Variable	Pre-election 12-month period		Post-election 12-month period	
	AEs	EMs	AEs	EMs
Election window	-0.017*	-0.058**	0.022**	0.038
	(0.010)	(0.024)	(0.009)	(0.028)
Country-year F.E.	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes
Observations	5916	1740	5916	1740
R-squared	0.169	0.272	0.169	0.269

Notes: The results are based on equation 1. The dependent variable is a dummy which takes the value of 1 in the months during which there is a tax news shock (where the period between the announcement and implementation dates is shorter than 90 days) including tax decreases and increases, and 0 otherwise. Columns 1 and 3 (2 and 4) employ the test in the subsample consistent of AEs (EMs), where the list of EMs is adopted from the IMF. In columns 1-2, the election window dummy variable takes the value of 1 for the 12-month period before elections and the election months, and 0 otherwise. In columns 3-4, it is 1 for the 12-month period after elections, and 0 otherwise. Standard errors in parentheses are clustered at the country-year level. *** p<0.01, ** p<0.05, * p<0.1.

5. Conclusion

In this paper, we investigate the nature of unanticipated tax policy changes by focusing on a determinant in the realm of political economy, namely electoral cycles in those events. In particular, we examine whether elections play a role on the duration of the implementation lag of tax policy changes, thereby changing the likelihood of tax policy surprises ("tax news shocks"). Based on monthly data from 22 advanced economies and emerging markets over the period 1990-2018, we show that implementation lags become significantly longer for tax policy change announcements that are made the pre-election periods, leading to a decrease in the likelihood of tax news shocks. The probability of a tax news shock typically decreases by between 2 to 3 percentage points for the policy change announcements made in pre-election periods.

Conversely, implementation lags turn out to be shorter for tax policy changes that are announced in post-election periods, thereby generating more frequent tax news shocks. The probability of tax news shocks typically increases by 3 percentage points for policy announcements made during post-election periods. These patterns remain similar focusing on tax news shocks related to various tax measures or types of taxes. The empirical specifications absorb the effects of all country-specific factors that change at an annual frequency, or all monthly developments that are common across countries, on the likelihood of tax news shocks. The findings are also robust to various checks, including alternative definitions of tax news shocks, or to controlling for several economic variables and institutional factors.

The finding that tax policy surprises exhibit electoral cycles has implications for macroeconomic outcomes and policy making. The literature suggests that anticipated tax policy changes entail significant intertemporal substitution effects of taxable activities, and therefore, substantially different macroeconomic effects (on output and other variables) at the time of announcement versus the actual implementation. Moreover, unanticipated tax policy changes can contribute to economic policy uncertainty, which has been shown to yield undesired macroeconomic outcomes. In light of these factors, the change in the likelihood of tax

news shocks occurring around elections suggests new evidence on channels through which elections can shape macroeconomic outcomes.

In that context, reducing fiscal policy uncertainty especially around elections appears to be a desirable policy goal. The results presented in this paper indicate that lags between announcements and implementation of tax policy changes are exceptionally shorter in post-election periods, which is possibly shaped by the governments' political agenda. This generates more frequent policy surprises with the ensuing potentially undesirable effects. Policy makers could therefore consider imposing mechanisms to reduce incentives to behave in an opportunistic manner in the aftermath of elections through, for example, procedural fiscal rules or reforms to budget processes that would promote transparency and ensure predictability on tax policy changes. These efforts could entail benefits in terms of enhanced credibility (by anchoring of expectations) and increased effectiveness (Leeper 2009, End and Hong 2022) that could translate into lower spreads and risk premia, for example.

Nonetheless, it is important to bear in mind that some theoretical contributions in the literature suggest that under certain circumstances unanticipated policy changes might have less detrimental effects than anticipated ones. For example, Korinek and Stiglitz (2009) show that permanent unanticipated changes in dividend tax rates have only small effects on investment as they affect mostly mature firms, but anticipated dividend tax changes create incentives for firms to engage in inter-temporal tax arbitrage, potentially distorting aggregate investment. But while the negative effects of policy uncertainty have been amply documented empirically, the evidence for potentially positive effects of policy surprises remains somewhat elusive.

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Appendix

Elections in the Sample

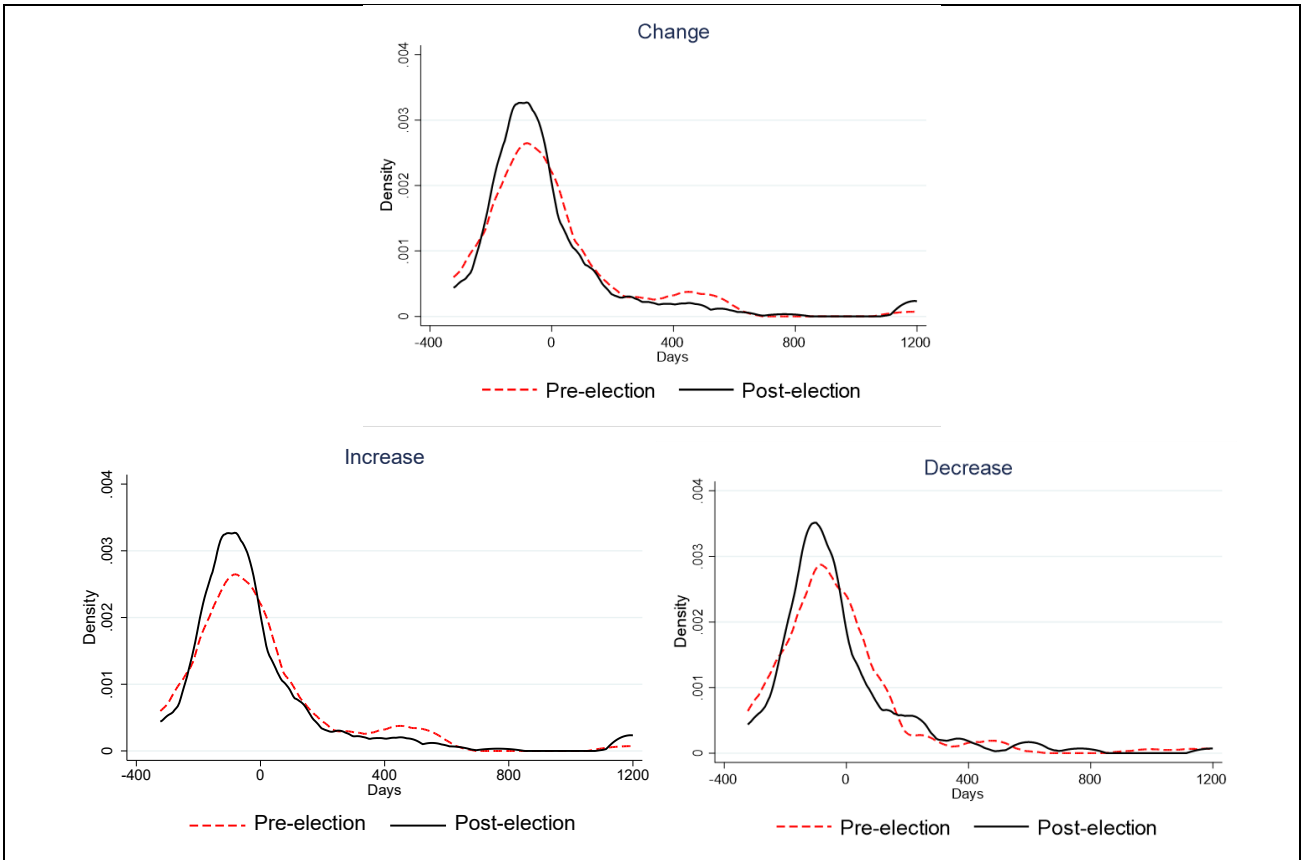
Table A.1. Elections in the sample

Australia	Czechia	Germany	Japan	Poland	UK
3/1990	6/1990	12/1990	2/1990	10/1991	4/1992
3/1993	6/1992	10/1994	7/1993	9/1993	5/1997
3/1996	6/1996	9/1998	10/1996	9/1997	6/2001
10/1998	6/1998	9/2002	6/2000	9/2001	5/2005
11/2001	6/2002	9/2005	11/2003	9/2005	5/2010
10/2004	6/2006	9/2009	9/2005	10/2007	5/2015
11/2007	5/2010	9/2013	8/2009	10/2011	6/2017
8/2010	10/2013	9/2017	12/2012	10/2015	
9/2013	10/2017		12/2014		
7/2016			10/2017		
Austria	Denmark	India	Korea	Portugal	USA
10/1990	12/1990	5/1991	12/1992	10/1991	11/1992
10/1994	9/1994	4/1996	12/1997	10/1995	11/1996
12/1995	3/1998	2/1998	12/2002	10/1999	11/2000
10/1999	11/2001	9/1999	12/2007	3/2002	11/2004
11/2002	2/2005	4/2004	12/2012	2/2005	11/2008
10/2006	11/2007	4/2009	5/2017	9/2009	11/2012
9/2008	9/2011	4/2014		6/2011	11/2016
9/2013	6/2015			10/2015	
10/2017					
Brazil	France	Ireland	Luxembourg	Spain	
10/1994	3/1993	11/1992	6/1994	6/1993	
10/1998	6/1997	6/1997	6/1999	3/1996	
10/2002	6/2002	5/2002	6/2004	3/2000	
10/2006	6/2007	5/2007	6/2009	3/2004	
10/2010	6/2012	2/2011	10/2013	3/2008	
10/2014	6/2017	2/2016	10/2018	11/2011	
10/2018				12/2015	
				6/2016	
Canada	Greece	Italy	Mexico	Turkiye	
10/1993	4/1990	4/1992	8/1994	10/1991	
6/1997	10/1993	3/1994	7/1997	12/1995	
11/2000	9/1996	4/1996	7/2000	4/1999	
6/2004	4/2000	5/2001	9/2006	11/2002	
1/2006	3/2004	4/2006	7/2012	7/2007	
10/2008	9/2007	4/2008	7/2018	6/2011	
5/2011	10/2009	2/2013		6/2015	
10/2015	6/2012	3/2018		11/2015	
	9/2015			6/2018	

Implementation Lags and Election Periods

Figure A.1. displays the distribution of the implementation lags for tax policy change announcements in the sample during pre- and post-election 12-month periods. To isolate the influence of country-specific time-invariant factors on implementation lags, we first regress the implementation lags of the announced policy measures on country fixed effects and report the residuals from that regression (which leads to both negative and positive values as shown in the charts). The chart on the first row shows the distributions around election periods based on tax policy changes including both tax increases and decreases. The left-hand (right-hand) side chart on the second row shows the distribution for the announcement regarding tax increases (decreases). The figures show that the distribution tends to shift right in pre-election periods (dotted red lines) compared to the post-election windows (solid black lines), pointing to longer implementation lags before elections.

Figure A.1. Implementation lags in the sample



Notes: The chart on the first row displays the distribution of implementation lags of the tax policy change announcements (including both tax increase and decrease) that are made during the 12-month periods before (dotted red line) and after elections (solid black line). The left-hand side (right-hand side) chart on the second row illustrates the distribution of implementation lags of the tax policy change announcements with a tax increase (decrease) that are made during the 12-month periods before and after elections. Implementation lags are net of country fixed effects. We note that the pre-election period includes 12 months running up to the elections and the election months as with the regression analysis above.

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