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Rousseau's social contract or Machiavelli's virtue? A measure of fiscal credibility

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Rousseau's social contract or Machiavelli's virtue? A measure of fiscal credibility*

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Abstract

The concept of fiscal credibility is a watermark of some of the fiscal policy literature, but beyond an intuitive parallel with monetary policy, it remains not well defined, nor measured. This paper provides an explicit measure of fiscal credibility, based on the anchoring of private expectations onto official targets. I document how credibility varies among a sample of 26 European countries and evolves over 1995–2019. I find that private agents do not trust all governments uniformly. Country differences are mainly driven by past fiscal performance and institutions (fiscal rules and councils). Conversely, I find that credibility impacts sovereign financing conditions, as well as macroeconomic performance. Governments should thus strive to be (*à la* Rousseau) or appear (*à la* Machiavelli) credible.

JEL classification: E60, H30, H11

Keywords: Fiscal policy, credibility

1 Introduction

Compared with monetary policy, fiscal policy is often seen as the prodigal son of the macroeconomic policy toolkit. The literature seems to consider it a less powerful tool than monetary policy—an "alchemy" rather than a "science" (Leeper 2010)—even though during crises, such as the 2008–09 Global Financial Crisis and the current CoViD-19 crisis, fiscal policy emerges as easier and faster to deploy. At the root of fiscal policy's bad reputation, there is the fundamental time-inconsistency of governments, making their

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announcements and commitments difficult to trust. In other words, there is a common belief that most governments, by their political nature and relatively short-term incentives, lack credibility.

The concept of credibility is rooted in the simple idea that policymakers commit to certain policies with a view to achieving certain objectives. When economic agents (*i.e.* voters, markets, consumers, investors) expect that this commitment will be fulfilled, the policies are deemed credible. On the contrary, if economic agents believe that policymakers will deviate because of an unfavorable structure of political incentives and costs, policies are not credible. Therefore, credibility is synonymous for "anchored expectations," meaning that private agents believe that what governments announce will happen, at least within a reasonable margin of error and with a certain likelihood. Conversely, there are reasons why private expectations may differ from the government's announcements. If stated policy objectives were overtly unsustainable or unrealistic, markets and other observers would expect them not to be pursued for long, as financing constraints would soon face the undisciplined government and trigger a market-forced adjustment in fiscal policy. On the other hand, even when stated policies are virtuous, private agents can perceive incentives for the government to deviate. More generally, a government, which pursues multiple, non-explicit objectives, has plenty of reasons to deviate from its budget plan, thus generating instability in the formation of people's expectations.[1] Thus, both situations are not credible: a government that announces bad policies, or a bad government that has incentives to deviate, that is, time inconsistencies under limited commitment.

The literature has so far failed short to precisely coin the concept of fiscal credibility. One reason is that, contrary to monetary policy, it is more difficult to associate fiscal targets with a reputable norm. In the monetary policy literature, credibility is achieved when expectations are anchored, and the anchor is optimal (low and stable inflation). A central bank is typically not perceived as "credible" if it convinces private agents that it will pursue a hyper-inflationary or deflationary policy. However, the argument cannot be easily transposed in the fiscal world. There is no clear optimal benchmark for fiscal policy. This is primarily because fiscal policymakers generally pursue multiple objectives and trade-offs—the famous stabilization, allocation, and distribution functions outlined by Musgrave (1959).

This paper fills a gap in the literature by providing an explicit measure of fiscal credibility. Mimicking the monetary literature, my main measure is the divergence between private expectations and official targets about the overall fiscal deficit. The intuition is that a credible government should succeed in anchoring expectations through the release of official forecasts. Anchoring not only means a relatively small spread between private and official forecasts, but also a low dispersion and overtime stability of private forecasts (Capistrán and Ramos-Francia 2010; Dovern, Fritsche, and Slacalek 2012; Demertzis, Marcellino, and Viegi 2012; Kumar et al. 2015). In particular, credibility should not vary across the business cycle. Building on these principles, I compile several other, complementary indicators of fiscal credibility. Using the governments' stability and convergence programs (SCPs) and draft budgetary plans

1. The monetary policy equivalent, even though in a much simpler context of dual objectives, is the inflation surprise framework.

(DBPs) and the Consensus Economics forecasts as main sources, I collect data for 26 European countries over the 1995–2019 period, totaling more than 4,250 observations.

The paper then proceeds by deriving some regularities about this credibility indicator. I discuss first how countries are performing from a static perspective; I look at what countries are, on average over the sample, the most credible—that is, whose official forecasts have been the most successful at anchoring private expectations. I find substantial differences across countries, and correlations between my various indicators. For some countries, there is a systematic bias between official announcements and market players' beliefs, as highlighted by the average credibility over the time sample. This, in itself, confirms that agents are more wary about some countries than others and raises questions as to what makes agents trust some countries more. Then, I examine how credibility is a persistent process that builds up and fades only slowly over time.

I identify correlations between fiscal credibility and the macroeconomic, institutional, and political environment, along with fiscal policy objectives and track record. I confirm, through panel regressions, that these factors influence agents' opinions about how credible a government and its fiscal targets are. I find that credibility is persistent and responds to the release of new official targets. I confirm that credibility is influenced simultaneously by the macroeconomic environment, policy decisions and results, and the institutional setup—but among those, the most influential factors are the policy variables. Credibility erodes when the government runs a higher public debt or a larger deficit, when there have been larger slippages in the past, and when planned fiscal adjustment is more ambitious. Institutions, such as fiscal rules and fiscal councils that sets macroeconomic assumptions for the budget and monitors budget implementation, can contribute to improve credibility. Yet, they are not enough, *per se*, to ensure credibility, and rather operate by improving policymaking practices. The structure of the economy and the composition of public debt, as well as electoral cycles, economic uncertainty, and the government's political orientation play but a marginal role. This in turn proves that the credibility indicator developed in this paper captures well the agents' responses to policy announcements and track record and truly reflects the confidence in the government's announcements rather than the strength of the economy.

Following the framework in End (forthcoming), I form the hypothesis that fiscal credibility is conducive of better fiscal and macroeconomic outcomes. Once fiscal credibility is established, fiscal policymakers can have more flexibility to respond to shocks and temporarily deviate for her objectives, improving the effectiveness of fiscal policy (similarly to the credibility hypothesis in the monetary policy literature). By contrast, the lack of credibility might put a budget off track: because financing might become scarcer or more expensive, because agents refuse to comply with tax legislation, or else because they save more than optimal, to prepare for future tax hikes. More intrinsically, fiscal credibility affects expectations and thereby intertemporal allocations; it should thus impact the sovereign interest rates, as well as consumption and investment decisions. If private agents do not expect the government to be able to deliver its fiscal promises, they might be afraid of future fiscal consolidation episodes, and respond by increasing precautionary savings (as they do under Ricardian equivalence, but for a radically different rationale).

I find a strong confirmation that credibility affects market perception and prices. Better credibility is significantly associated with better market indicators of sovereign risk. I also find some evidence that credibility and macroeconomic performance are related—namely, higher credibility is associated with higher GDP growth, and this seems to stem from both higher investment and higher private consumption.

The fiscal literature usually adopts a more positive approach. Many papers delve into whether the fiscal stance sustainable and whether there are some normative thresholds (e.g., Collard, Habib, and Rochet 2013). They thus seem to consider governments as credible whenever they are within such thresholds. By contrast, I posit that governments should seek to have agents believe, as such a credibility factor helps anchor expectations and deliver better macro-fiscal outcomes (Leeper 2009). As noticed by Baker, Bloom, and Davis (2016), fiscal policy is the largest source of policy uncertainty; anchoring expectations would thus make fiscal measures more predictable and more effective. As such, my approach has some contiguity with articles on fiscal forward guidance (Fujiwara and Waki 2017), although the latter concept remained heterodox.

There are some similarities between the indicators built in this paper and other fiscal measures commonly used in the literature. First, research on budget forecasts and fiscal slippage looks at the gap between forecasts and outturns, while I consider the gap between private and official forecasts. It uses this as a measure of forecasting errors; a bad track record of forecasting performance can certainly be expected to undermine the credibility of the government's announcements, but it is not necessarily the only component of credibility. Second, similarly to the fiscal foresight literature (Forni and Gambetti 2010; Leeper Eric M., Walker Todd B., and Yang Shu-Chun Susan 2013; Forni and Gambetti 2016), I measure how agents embed fiscal shocks in their expectations and to what extent these fiscal shocks come as a surprise. Yet, my main channel is confidence, while the empirical literature related to fiscal foresight utilizes the intrinsic lags in the legislative and effective implementation of fiscal policy decisions, which allows private agents to receive clear signals about the tax rates and transfers they will face in the (near-term) future. Third, there is an obvious analogy between this paper and the monetary policy literature, since I try to capture how well official targets and announcements help anchor private expectations.

The concept of fiscal credibility relates also to a broad stream of macroeconomic fiscal policy literature. For instance, the debate on expansionary versus recessive fiscal contractions is premised on whether Ricardian effects transit through the expectation formation process. However, it neglects the fact that Ricardian equivalence is based on strong assumptions, for instance that private savings and government debt yield the same interest rate (Buchanan 1976). Credibility considerations could on the contrary invalidate this assumption. More importantly, if agents do not trust the government achieve its fiscal commitments, then their response in terms of savings could be different from what Ricardian equivalence would anticipate. The empirical literature on fiscal multipliers is generally based either on observed fiscal outcomes, or on policy announcements; both fail to capture what agents expectations truly are. Likewise, recent mutations in fiscal policymaking, such as the implementation of fiscal councils, fiscal rules, and medium-term budgeting, have all been advocated by the need for governments to constrain their discretion and restore

or improve their fiscal credibility. The literature on fiscal dominance is but a warning to central banks that monetary credibility can easily be jettisoned by irresponsible—incredible—governments.

The next section develops the intuition and methodology underpinning the credibility indicators developed in this paper. Section 3 then describes credibility inequalities between countries, before section 4 examines the dynamics of credibility and its correlation with other indicators. Building upon these stylized facts, section 5 conducts the empirical identification of credibility factors and impacts. Section 6 concludes with some political economy implications, especially in the current CoViD-19 context.

2 An indirect measure of fiscal credibility

This paper proposes a novel proxy for fiscal credibility (or rather for the lack thereof): the gap between market forecasts and official plans for the fiscal balance. The intuition is that a credible government should succeed in anchoring expectations through the release of official forecasts. This approach mimics that of the monetary policy literature, which shows that the extent of anchoring is intimately related to the credibility of the monetary strategy (Cukierman and Meltzer 1986; King 1995; IMF 2018). Similarly, if a government is credible enough, private expectations about fiscal outcomes should be centered around the government's targets.

I focus on the fiscal balance (as a percent of GDP), which is the main headline, high-level summary of fiscal stance that everyone comments and monitors (media, watchdogs, and supranational institutions alike). Because of the close link between the fiscal deficit (*i.e.*, the government's financing need) and public debt, governments usually communicate on their annual deficit targets and justify slippages with respect to these targets. In other words, the fiscal balance corresponds to the natural headline target of fiscal policy—its main anchor. Importantly, it is also an aggregate indicator, which reflects myriad factors that act in concert (even more so than inflation in the case of monetary policy analysis) and a decentralized decision-making process (within and between several administrative levels of governments).[2]

Thus, the main measure of credibility developed in this paper is holistic, in the sense that it captures any difference in forecasts between the government and private agents. Implicitly, I assume that, as long as the government and the market observe the same information, they should produce similar forecasts.[3] My credibility indicator includes a *pure credibility* factor—the degree of agents' trust in the government's willingness and ability to achieve the targets it sets forth—, but also possibly a different time horizon, diverging views on the macroeconomic context, access to various sets of information, and a different balance of risks (governments tend to be more optimistic).

2. Outturns sometimes reflect the behavior of a particularly trouble-making state (e.g., Catalonia in Spain) or agency (e.g., an ill-governed state-owned enterprise). Notably, my credibility indicator misses all forms of off-budget items, such as contingent liabilities.

3. In practice, though, governments probably have a more forward-looking time horizon than private agents, thus factor in more long-term information and react less to temporary shocks.

I choose to look mainly at the overall balance rather than a cyclically-adjusted or structural measure, as I consider that a government's counting on implausible macroeconomic assumptions lacks as much credibility as a government inflating its revenue projections. I consider that a credible enough government should be able to convince that it will reach its target, independently of news, transitory shocks, or cyclical developments. If need be, a government can in theory always adjust its spending to meet its overall balance target, were its revenues to exceed or come short of expectations. However, this is not always optimal. There may be reasons not to follow too strictly the initial budget target—typically, to avoid procyclicality when the economic environment abruptly changes. This is only possible when governments already enjoy a certain credibility.[4] To check the implications of this methodological choice, I also develop a cyclically-adjusted indicator of credibility (Appendix C).

For each country i and monthly date t in my sample, I compute the discrepancy between private (superscript p) and official (superscript o) expectations ($\mathbb{E}$) regarding the overall fiscal balance in h years ahead, expressed in percent of GDP and denoted $b_{i,t+h}$.[5] By convention, the indicator is positive when the government expects a lower fiscal balance (i.e., a larger deficit) than observers.

Definition 1 (Relative, instantaneous credibility)**.** The $(t+h)$-credibility of country i at time t is:

$$Cred_{i,t}^{(h)} \equiv \mathbb{E}_t^p b_{i,t+h} - \mathbb{E}_t^o b_{i,t+h} \tag{1}$$

For government expectations, I collect official plans, as detailed in governments' SCPs and DBPs. SCPs are the main tool for the European Union to coordinate national fiscal policies since the 1997 Stability and Growth Pact (SGP). Countries whose currency is the euro submit annually a stability programs to the European Commission, while others submit a convergence program. Since the 2012 "two-pack" SGP reform, euro members additionally need to submit DBPs to the Commission when they send draft budgets to their own parliaments.

These various budgetary plans provide objectives rather than forecasts, akin to a central bank's inflation objective (except that they are more frequently redefined). They rely on macroeconomic forecasts and modelling, and incorporate some policy buffers so that governments can in theory adjust to shocks without missing their budgetary targets. I rely mainly on these plans and programs prepared for European institutions rather than national budget documents, for they have to follow an imposed format and be translated to English, making them more comparable and more widely commented on by European mar-

4. Similarly, central banks should in theory not respond to supply-side shocks (e.g., temporary bursts of imported inflation or one-off changes in indirect tax rates), but may have to if their credibility is not solidly established yet and inflation expectations would respond too forcefully.

5. This notation is slightly abusive, for t is a monthly date. The subscript $t+h$ is to be understood as a simplification for year $\lfloor t/12 \rfloor + h$. Besides, in this paper, I use the convention that year y stands for the fiscal year $y/y+1$. This is only relevant for the U.K., whose fiscal year starts in April, whereas the budget year of EU countries coincides with calendar years.

kets. During financial assistance programs ("programs" in the rest of this paper), countries file program and review documents rather than SCPs. Therefore, I incorporate program targets into my dataset.[6]

For private forecasts, the main source is the Consensus Economics publications. Each month since 1989, this economic survey organization polls the macroeconomic forecasts of more than 700 economists worldwide, mostly within investment banks and economic research institutes. The published Consensus forecast is the unweighted, arithmetic average of each respondent's forecast:

$$\mathbb{E}_t^p b_{i,t+h} = \frac{1}{N_{i,t}^{(h)}} \sum_{forecaster}^{N_{i,t}^{(h)}} \mathbb{E}_t^f b_{i,t+h} \tag{2}$$

It thus measures the central forecast of the market and private agents in general. While European governments provide official fiscal forecasts with a medium-term horizon, the Consensus forecasts mainly cover the current and upcoming years, so in this paper I focus on $h \in \{0, 1\}$.[7] For some countries, the Consensus provides fiscal balance forecasts in nominal terms rather than a ratio of GDP; in such instances, as the Consensus does not comprise a nominal GDP forecast, I approximate the latter by assuming that: (1) the government and the market always share a common estimate of what nominal GDP was in the preceding year—given by the contemporaneous IMF's World Economic Outlook (WEO) forecast; (2) and private forecasters consider that GDP deflators grow at the same rate as consumer price indices.[8] I also complement the Consensus Economics data with market forecast data that are compiled by Bloomberg.[9]

While some papers about forecast interference highlight that forecasters might have strategic reasons to produce biased revenue forecasts or other forecasts where they have a cost-minimizing preference (Danninger, Kyobe, and Cangiano 2005; Christoffersen and Diebold 1997), this is unlikely the case with the fiscal balance. I thus consider the Consensus' fiscal balance forecast to reflect the market's best prediction of fiscal outcomes, summarizing its views on current revenue and budget policies, past government's performance, and exogenous factors.[10] Both the Consensus and Bloomberg provide mean forecasts across a pool of forecasters, but the latter do not necessarily update their projections every month. This admittedly generates persistence in the mean forecast, which might take a few months to respond to news shocks, such as the release of a new official fiscal plan. Such latency does not necessarily signal a lack of fiscal cred-

6. I limit this exercise to fiscal programs (those with Portugal, Ireland, Cyprus, and Greece), hence excluding the banking sector support program in Spain and the balance of payment assistance programs in Hungary, Latvia, and Romania.

7. The idea of anchoring, especially in the monetary policy literature, is meant as more medium-term concept, but as far as I know, private agents rarely disclose their medium-term fiscal expectations. One could nevertheless argue that, given typical implementation lags for fiscal policy, fiscal credibility already materializes in one-year-ahead forecasts.

8. In other words, I infer recursively the Consensus' nominal GDP forecast, starting with $\mathbb{E}_t^p Y_{i,t-1} = Y_{i,t-1}|_{\text{WEO}_t}$ and chaining:

$$\mathbb{E}_t^p Y_{i,t+h} = (1 + \mathbb{E}_t^p g_{i,t+h})(1 + \mathbb{E}_t^p \pi_{i,t+h})\mathbb{E}_t^p Y_{i,t+h-1}$$

Then, I linearly interpolate fiscal year GDP, as necessary.

9. With Bloomberg, I extend the coverage to Austria, Belgium, Cyprus, Denmark, Finland, Greece, Ireland, and Portugal, as well as the time coverage for the Netherlands, Spain, and Sweden. As a data compilation rule, I give precedence to Consensus Economics, which generally polls more forecasters than Bloomberg.

10. By contrast, there is a clear case for governments to adopt strategic forecasts: this is exactly what I want to capture.

ibility, but it prevents the mean forecast to jump too fast in response to receiving new information (e.g., high-frequency data). This is preferable, as government forecasts are updated even less frequently than private forecasts, usually once or twice a year. Importantly, I conjecture that credible fiscal targets and anchored expectations should weather news shocks steadily, trusting the government to take the necessary action to achieve its objectives.

I compute the fiscal credibility of 26 European countries, covering 1995 to 2019 and totaling 4,250+ data points. The sample includes the United Kingdom and all European Union (EU) countries, except for Luxembourg and Malta (Appendix A). While equation (1) provides an instantaneous measure of fiscal credibility, I derive various complementary metrics aimed at capturing the intrinsic degree of fiscal credibility of a government.

First, as in the forecasting bias literature (e.g., J. Frankel and Schreger 2013), the average credibility over a period of time $\mathcal{T}$ is a proxy for a systematic bias between official announcements and market players' beliefs.

$$Cred_{i,\mathcal{T}}^{(h)} \equiv \left\langle Cred_{i,t}^{(h)} \right\rangle_{t\in\mathcal{T}} = \frac{1}{\|\mathcal{T}\|} \sum_{t\in\mathcal{T}} Cred_{i,t}^{(h)} \tag{3}$$

Second, the average absolute value of credibility is a measure of how far private forecasts are compared with official plans—it captures symmetrically the extent of the disbelief, whether markets are more optimistic or less. In the forecasting error literature, such an indicator measures accuracy, rather than bias. Yet, I depart slightly from the literature (e.g., Demertzis, Marcellino, and Viegi 2012; Kumar et al. 2015), which commonly relies root-mean squared error (RMSE) statistics, in order to penalize more larger errors. I rather refrain from weighting more larger deviations, to be more neutral. The higher this absolute indicator, the less anchored are private expectations, the less credible the government. Moreover, this measure of credibility is symmetrical: I deliberately remain agnostic as to whether it is better for governments to be more or less optimistic than the private sector.[11]

$$ACred_{i,\mathcal{T}}^{(h)} \equiv \frac{1}{\|\mathcal{T}\|} \sum_{t\in\mathcal{T}} \left| Cred_{i,t}^{(h)} \right| \tag{4}$$

Third, since credibility is the ability to anchor expectations, credible governments should foster sufficient certainty to prevent markets from flickering whenever there is a shock or unexpected news. Therefore, another dimension of credibility is the volatility of market forecasts. Since Consensus forecasts are updated more often than official projections, credibility should also mean that markets should not flicker whenever an exogenous shock materializes, or economic news are posted. The more credible a government, the

11. Instead, I could have used a normative measure, such as

$$\exp^{\lambda\left(\mathbb{E}_t^o b_{i,t+h} - \mathbb{E}_t^p b_{i,t+h}\right)} - 1 - \lambda\left(\mathbb{E}_t^o b_{i,t+h} - \mathbb{E}_t^p b_{i,t+h}\right)$$

to penalize more situations where governments are seen as too optimistic.

stickier market anticipations. We measure this by looking at the standard deviation of $Cred_{i,t}^{(\cdot)}$:

$$Vol_{i,\mathcal{T}}^{(h)} \equiv \left[\frac{1}{\|\mathcal{T}\| - 1} \sum_{t \in \mathcal{T}} \left(Cred_{i,t}^{(h)} - Cred_{i,\mathcal{T}}^{(h)} \right)^2 \right]^{1/2} \tag{5}$$

One can note that for a period of time $\mathcal{T}$ when the government keeps its fiscal target unchanged, $Vol_{i,\mathcal{T}}^{(h)}$ is also the standard deviation of mean private forecasts. I will use later a rolling version of this definition to proxy the recently-observed volatility: $Vol_{i,t}^{(h)} \equiv Vol_{i,\{t-12,\ldots,t-1\}}^{(h)}$.

Last, by virtue of anchoring expectations, credibility should also be associated with less dispersion in private forecasts (Capistrán and Ramos-Francia 2010; Dovern, Fritsche, and Slacalek 2012). The more credible the government, the more similar market anticipations should be. Hence, I examine the dispersion $SdCred_{i,\mathcal{T}}^{(h)}$ of the various private forecasts that compose the Consensus.[12]

3 Who is credible?

Market forecasts are more conservative (or pessimistic) than governments (as already found by J. A. Frankel and Schreger (2016)). On average over the sample, private forecasts of the fiscal balance are smaller than governments' targets, with a country-average credibility that is mostly negative and ranging between -1.1 and +0.1 percent of GDP (Figure 1). This bias is stronger the longer the forecast horizon; public forecasts are on average 0.3 percentage point higher than private anticipations for the current year deficit, and 0.5 percentage point higher for next year. This relates to the optimistic bias described in the forecast literature: actual outcomes tend to come short of governments' forecasts, especially GDP growth and fiscal policy costings. The authorities often justify their voluntarist forecasts by referring to self-fulfilling confidence effects—a theory that seems to fail, as agents seem to endogenize such an optimistic bias.

Absolute credibility is, on average in my sample, as high as 0.6-0.7 percent of GDP (Figure 1b). This is quite a large number, given that most of the overall balance outcomes lie within -6 and 3 percent of GDP. This result is not solely explained by a divergence of views on growth and inflation: levelling off the role of macroeconomic forecasts reduces the forecast spread by only 0.1 percent of GDP, so that the absolute

12. The Bessel-corrected standard deviation of the consensus is reported routinely by Consensus Economics:

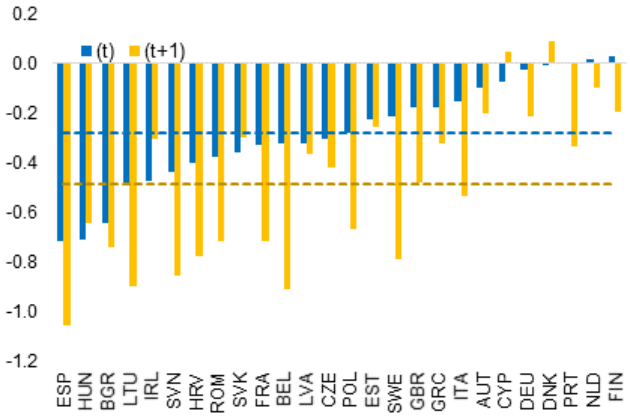
$$\sigma_{i,t}^{(h)} \equiv \sqrt{\frac{1}{N_{i,t}^{(h)} - 1} \sum_{f=1}^{N_{i,t}^{(h)}} \left(\mathbb{E}_t^f b_{i,t+h} - \mathbb{E}_t^p b_{i,t+h} \right)^2} \tag{6}$$

This statistic is unfortunately unavailable for countries covered only by Bloomberg data, which reduces my sample to 18 countries. Then I can average it over time:

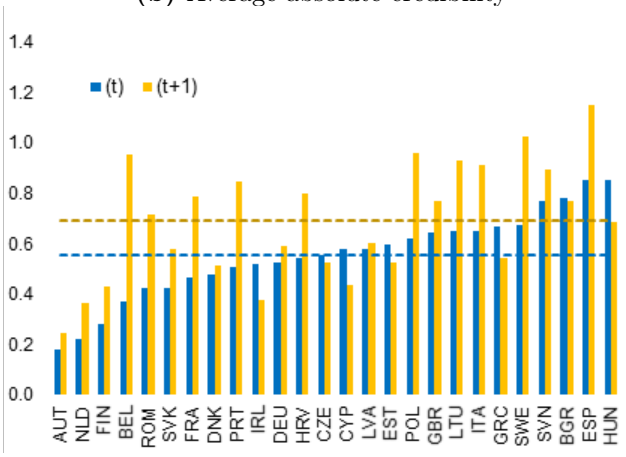
$$SdCred_{i,\mathcal{T}}^{(h)} \equiv \left\langle \sigma_{i,t}^{(h)} \right\rangle_{t \in \mathcal{T}} \tag{7}$$

Figure 1: *Cross-country comparisons (country averages, in percentage points of* GDP*)*

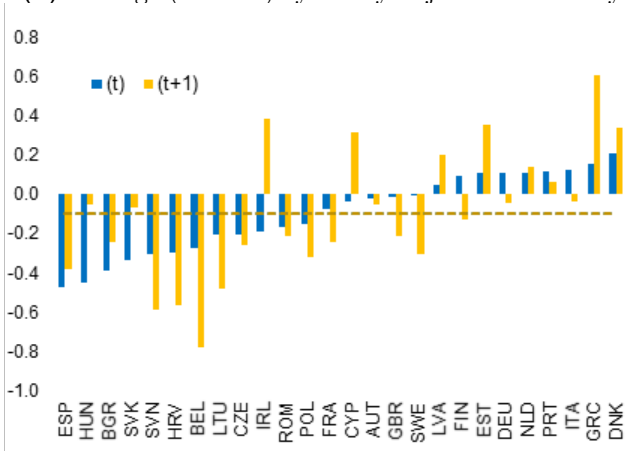
(a) Average (relative) credibility



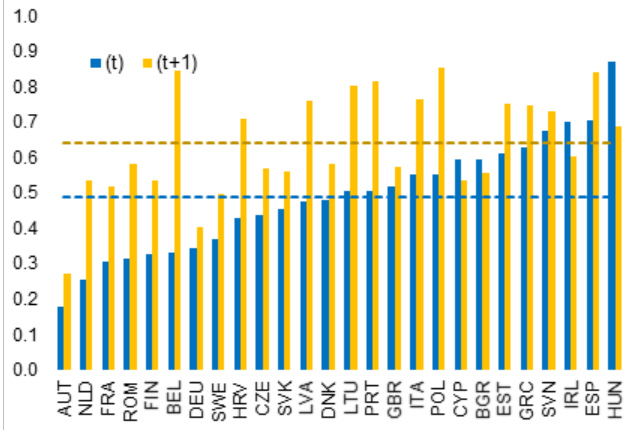
(b) Average absolute credibility



(c) Average (relative) cyclically-adjusted credibility



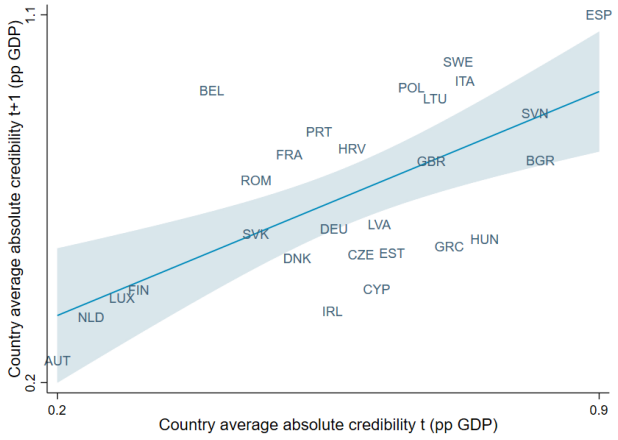
(d) Average absolute cyclically-adjusted credibility



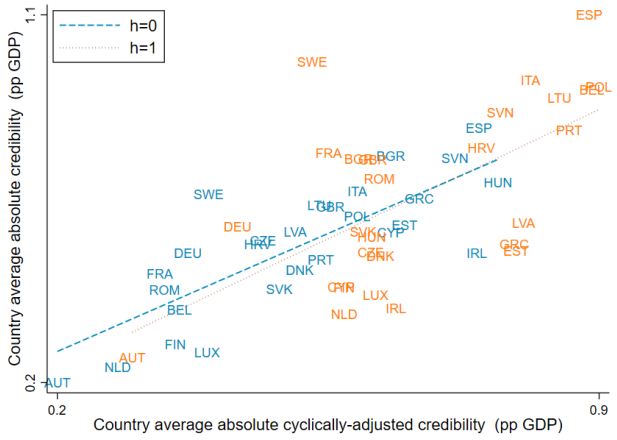
Notes: These charts (and most of those that follow) plot credibility for the current ("t" for $h = 0$) and upcoming ("$t + 1$" for $h = 1$) years. Dashed lines are the sample unweighted means. Country codes are per appendix A.

Figure 2: *Correlations between absolute credibility indicators (country averages, in percentage points of* GDP*)*

(a) Role of forecast horizon



(b) Role of cyclical component



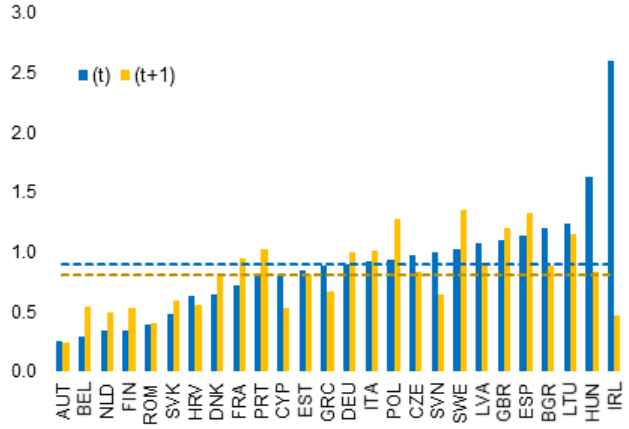
Note: The dotted lines are simple linear regressions.

cyclically-adjusted credibility is still an average of 0.5-0.6 percent of GDP (Figure 1d). This result is not driven by outliers either. There are a number of countries above the average, such as Bulgaria, Greece, Hungary, Spain, or Sweden, where shocks, political instability, and exchange rate uncertainty might play a role. Interestingly, some countries that fare well in terms of relative credibility indicator, such as Cyprus or Italy, do not necessarily perform as well in terms of absolute credibility, which indicates that private expectations are not well-anchored on government targets.

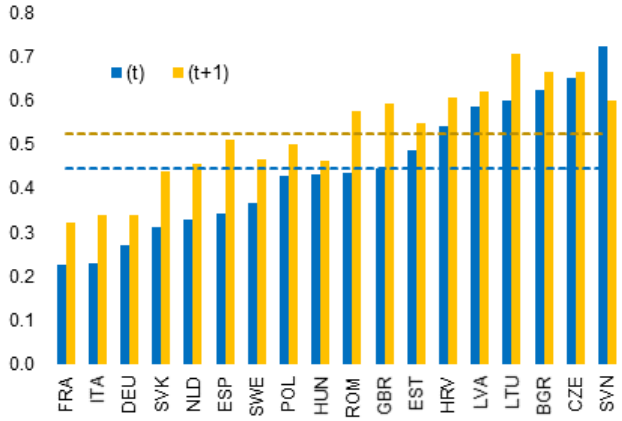
Credibility for in-year execution and credibility for next year plan are highly correlated, although not always aligned (Figure 2a). More precisely, private expectations are on average less anchored on government targets for a farther forecast horizon, and countries that are credible for current year budget targets are also in general more credible for outer years. Intuitively, the forecast horizon can influence the forecast spread in two ways. On the one hand, forecasts for outer years are inherently more uncertain, so that one could expect a larger divergence of views, the longer the horizon. Implementing a voted budget is also relatively straightforward for the economies in my sample, which all have relatively robust budgetary institutions and public financial management practices. Substantial deviations should thus not happen except when the government passes a revised budget or faces unforeseen exogenous shocks (e.g., swings in its financing conditions). By comparisons, multiyear budgetary targets are more less biding, so that they should anchor expectations less than annual budgets. This is particularly the case when there is political instability—which could explain for instance why Belgium, Croatia, or Portugal appear more credible for $h = 1$ than $h = 0$. On the other hand, private forecasters have less information to justify a strong, divergent opinion on future deficits. And they might also factor in weaknesses and recurrent slippages in budget execution (e.g., for Greece or Ireland). All in all, $Cred^{(1)}$ is thus likely to be a better indicator of

Figure 3: *Credibility and volatility (country averages)*

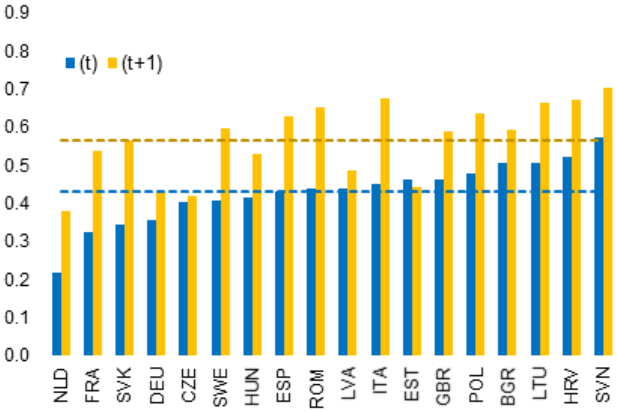
(a) Volatility across time (in percentage points of GDP)



(b) Dispersion of forecasts (in percentage points of GDP)



(c) Probability of private forecast divergence



Notes: Sample for *SdCred* is restricted by Consensus data availability. Dashed lines are the sample unweighted means. The probability on panel (c) is the probability that private forecasts be more than $\varepsilon = 0.5$ percent of GDP away from the government's target, assuming a normal distribution for private forecasts.

policy credibility, while $Cred^{(0)}$ may rather reflect implementation credibility and high-frequency news. This is why I will henceforth focus my analysis on $Cred^{(1)}$.

Correcting for the cyclical component of credibility reduces the bias observed in terms of relative credibility (Figures 1a–1c). This proves that the systematic optimistic bias governments have compared with private forecasters relates to some extent to underlying macroeconomic projections. However, this cyclical component plays a minor role on absolute credibility (Figure 2b).

For some countries in the sample, private forecast volatility is high, which also points to a credibility deficiency. The standard deviation of my main credibility indicator can be sizable, 0.8-0.9 percent of GDP on average for the whole sample, with some countries reaching an average of 2.6 percent of GDP

(Figure 3a). Volatility is on average lower for one-year-ahead forecasts, confirming the hypothesis that shorter-term forecasts are mostly updated along the news cycle. Second, the dispersion of the private forecasts is as high as 0.5 percent of GDP (Figure 3b). Seemingly, private forecasts are more consensual for large euro countries, compared with inflated by non-euro countries and beneficiaries of financial assistance programs.[13] This could be because, for larger countries such as France, Italy, or Germany, economic news are wider-spread and forecasts are updated on a more regular basis.

Ultimately, a credible government should be able to anchor *all expectations* in a narrow corridor around its target. Thus, I combine the average anchoring $Cred$ and the dispersion of forecasters around the average Consensus forecast $SdCred$ into a summary measure—namely, the likelihood for a private forecast to be outside a confidence interval around the official target. Assuming that the Consensus is a representative enough sample and that private forecasts follow a normal distribution, I compute the probability that forecasts lie further away from the official target than ε percentage point of GDP as follows:[14]

$$\begin{aligned} P_{i,t}^{(h)}(\varepsilon) &\equiv \mathbb{P}_f\left(\left|\mathbb{E}_t^f b_{i,t+h} - \mathbb{E}_t^o b_{i,t+h}\right| \geq \varepsilon\right) \\ &= 1 + \Phi\left(\frac{-\varepsilon - Cred_{i,t}^{(h)}}{\sigma_{i,t}^{(h)}}\right) - \Phi\left(\frac{\varepsilon - Cred_{i,t}^{(h)}}{\sigma_{i,t}^{(h)}}\right) \end{aligned} \tag{8}$$

Figure 3c reports the results for $\varepsilon = 0.5$ percent of GDP—a relatively liberal margin, given that 0.5 percent of GDP is typically the order of magnitude of an annual fiscal adjustment. More than 40 percent professional forecasters are likely to think the government target for the current year will be missed by a larger margin than ± 0.5 percent of GDP, and this proportion reaches almost 60 percent when it comes to next year's target.

Overall, all country ratings seem strongly related. Absolute credibility, volatility, and dispersion are highly correlated, thus capture different aspects of the same concept of credibility. Appendix Figure E.1 illustrates how these various country-level indicators relate to each other.[15]

4 Rise and fall of credibility

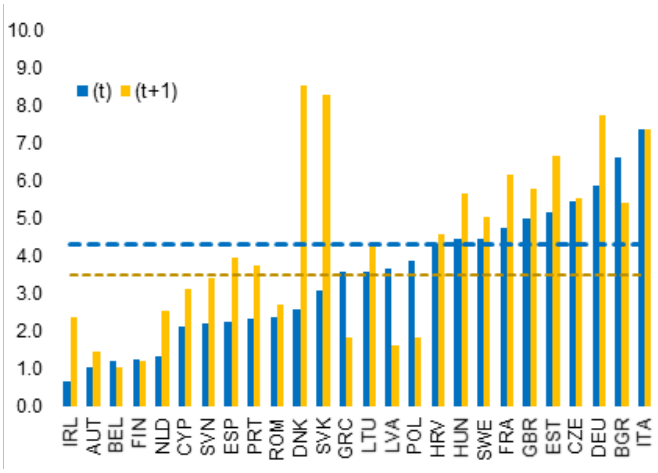
Beyond country averages, my credibility indicator sheds light on how well governments anchor expectations over time. Several regularities emerge from a visual analysis of credibility over time (Figures G.1–G.2 in Appendix). First, credibility for current year and next evolve generally in parallel, even though there can be some stress for current year that does not translate to next year anchoring.

13. Spain is an exception, since the program supported the banking sector resolution rather than the budget.

14. I let Φ denote the cumulative density function of the standard normal distribution.

15. I report in Appendix (Table E.1) pairwise Pearson's correlations between these indicators, as well as Spearman (1904)'s rank correlations (which are less sensitive to outliers than Pearson's correlations).

Figure 4: *Half-Life time of credibility (in months)*



Note: The half-life is the estimated time for a mean-reverting process to correct half of a deviation relative to the mean after a shock. Dashed lines are the sample unweighted means.

Credibility seems to oscillate around a country-specific *steady-state*, with (sometimes large) jumps in both directions that take more or less time to fade away. Augmented Dickey-Fuller (ADF) tests are used to check whether these times series are indeed realizations of mean-reverting processes and measure the persistence of credibility (or, in other words, the resilience to shocks). For some countries, the null hypothesis that credibility is not stationary cannot be rejected, while, for others, the test concludes to a mean-reverting process (Table H.1).[16] For all, I derive from the ADF regression a characteristic half-life time, that is the number of months it takes for a shock to be halfway corrected.[17] I find significant persistence in the lack of credibility—it takes up to 9 months for a confidence shock to be brought down halfway (Figure 4). in the same vein, I find a negative correlation between $ACred_{i,t}$ and $Vol_{i,t}$, suggesting that past volatility could hinder credibility.

Credibility behaves as a *capital of trust* that changes slowly. To investigate whether the traditional wisdom that it takes more time to build trust than lose it, I introduce a non-linearity in the ADF regressions.[18] For many countries in the sample, the credibility times series exhibit an asymmetric behavior. This indicates that once private forecasters anticipate an under-performance of the government (*i.e.*, a larger deficit than planned), it is harder to convince them otherwise than when they anticipate an over-performance.

16. Importantly for the empirical analysis that follows, however, all feasible variants of panel unit root tests (*i.e.*, Im, Pesaran, and Shin (2003)'s test or Fischer-type tests, given my panel is unbalanced) strongly reject the hypothesis that all panels are stationary.

17. ADF tests are based on the following regression: $\Delta Y_t = \alpha + \beta Y_{t-1} + lags(\Delta Y) + \epsilon_t$. The process Y is stationary when β is significantly lower than zero. I compute the half-life of the process as $\tau_{1/2} = \frac{-\ln 2}{\ln(1+\beta)}$.

18. I estimate the following: $\Delta Cred_t = \alpha + \beta Cred_{t-1} + \gamma Cred_{t-1}\mathbb{I}_{Cred_{t-1}<0} + lags(\Delta Cred) + \epsilon_t$ where $\mathbb{I}_X$ is a dummy that equals 1 when X, 0 otherwise. Appendix Table H.2 reports the estimated coefficients β, γ for each country. When $\gamma > 0$, credibility is restored more slowly after a negative shock than a positive shock.

What can help explain these country differences, and more importantly, these sizable variations over time? The remaining of this section examines the role of potential factors. Some of the charts classify countries in the sample into core EU economies, program countries, and Eastern Europe (as per appendix A), to check whether country heterogeneity may have an effect.

First, initial conditions, including the position in the business cycle and the fiscal stance, could impact credibility—even though these factors do not intrinsically change whether the government is virtuous or not. Governments seem to be more easily credible when growth is higher: on Figure 5a, the slope of the interpolation line between credibility and growth is negative, especially for most advanced economies. Even after taking out the cyclical component, expectations seem better anchored when the output gap is positive (Figure 5b). This might be because governments tend to underestimate fiscal multipliers when the output gap is negative or because private agents expect a countercyclical fiscal response. Furthermore, private forecasters seem to give a credibility premium to governments with an already sound fiscal stance, while they seem to penalize those that start off from a large deficit (Figure 5c).[19] The same can be observed with the initial public debt-to-GDP ratio or the sovereign yield, with the exception of program countries for which absolute credibility decreases with public debt and improves with interest rates. This could be because, in the case of programs, the larger the fiscal problems (in terms of debt overhang or financing costs), the stricter program monitoring is likely to be.

Second, institutions certainly matter, especially budgetary institutions. For instance, having a fully-staffed, qualified administration is a likely precondition for producing reliable forecasts that agents can trust. The development level, as measured by GDP per capita, is negatively associated with *ACred*; in particular in Eastern European countries, governments of the less developed economies seem to struggle more to anchor expectations (downward interpolation line on Figure 5e). More specifically, strong budgetary institutions should support the expectation-formation process, for they improve transparency and accountability. Among such institutions, fiscal rules and councils have been created to enhance the government's credibility (Debrun et al. 2013; Lledó et al. 2017; Beetsma et al. 2019). I verify in Figure 6 that expectations are better anchored when (preferably several) fiscal rules, a fiscal council, and some multiyear budget ceilings are in place. For the latter, an aggregate multiyear budget target seems to work better than item-level ceilings—which presumably few observers expect to hold the test of time. Unexpectedly, having core fiscal tasks performed by independent institutions is not clearly associated with stronger credibility. This is what Figure 6d shows, using the European Commission's Scope Index of Fiscal Institutions that measures the breadth of tasks discharged by independent agencies.[20]

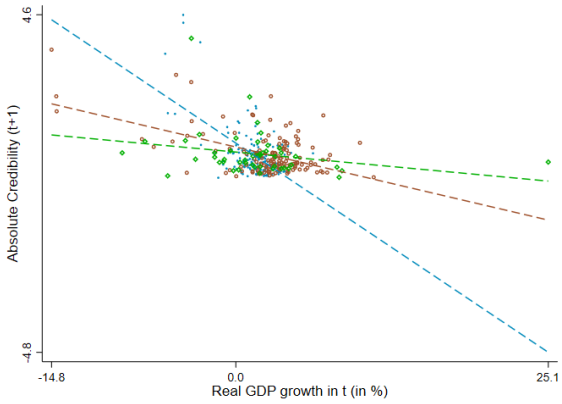
Third, fiscal policy is inevitably at the core of fiscal credibility, in at least two respects (beyond the soundness of the current fiscal stance): past fiscal slippages and the assessed quality or feasibility of fiscal plans. Governments almost systematically come short of promised fiscal adjustments (Beetsma, Giuliodori,

19. Visually, Maastricht's 3-percent deficit threshold does not appear to play any remarkable role.

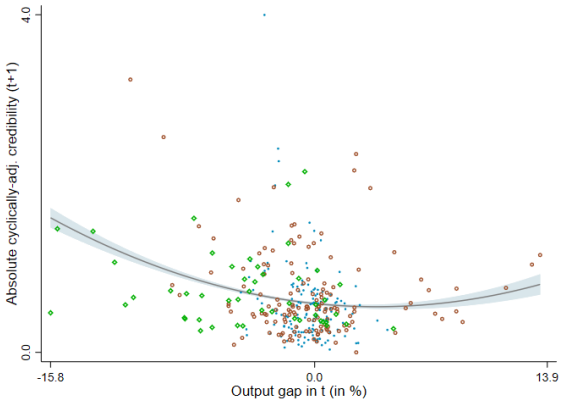
20. The tasks covered by the index are (1) monitoring of compliance with fiscal rules; (1) macroeconomic forecasting; (1) budgetary forecasting and policy costing; (1) sustainability assessment; (1) promotion of fiscal transparency; and (1) normative recommendations on fiscal policy.

Figure 5: *Absolute* $(t+1)$*-credibility and macroeconomic indicators (annual averages)*

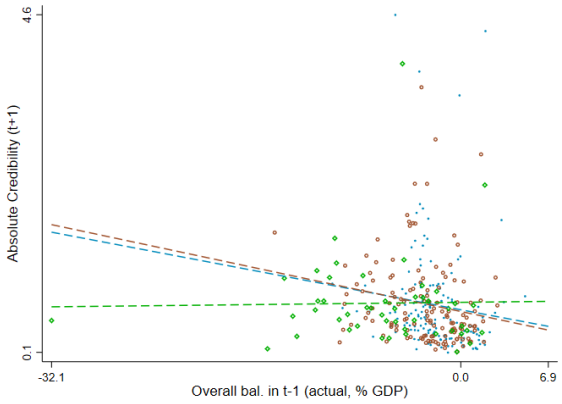
(a) Real growth



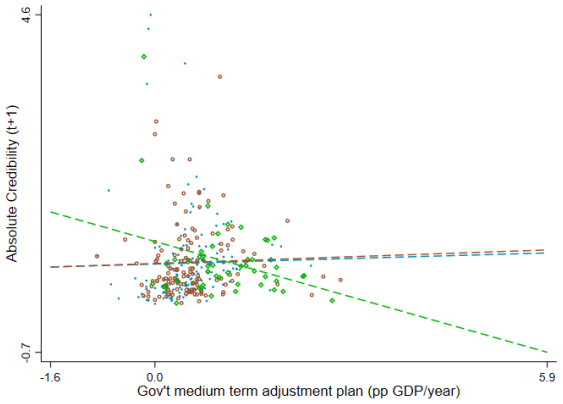
(b) Output gap



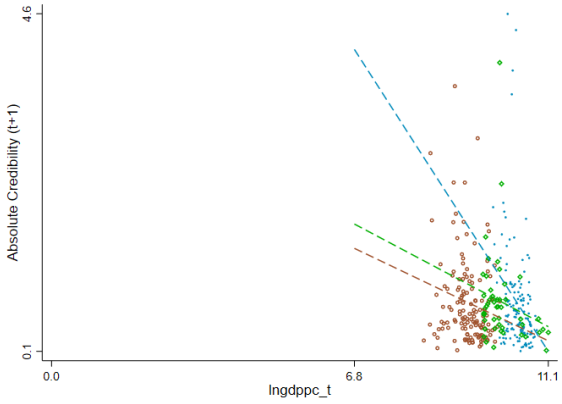
(c) Initial fiscal balance



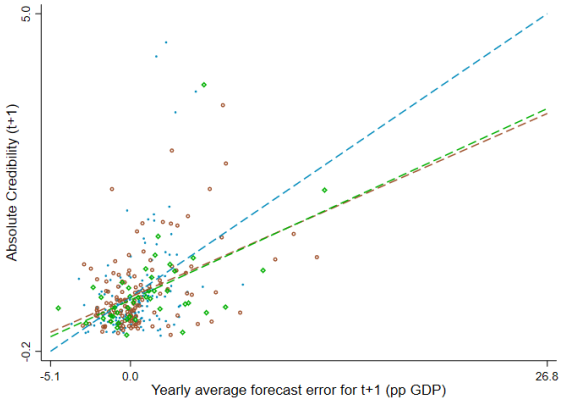
(d) Government medium-term adjustment objective



(e) GDP per capita (in log)



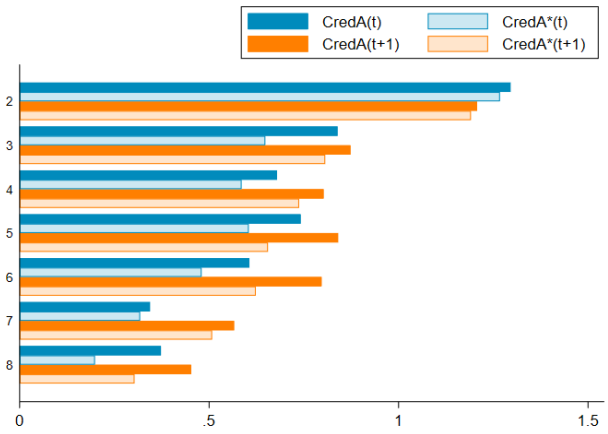
(f) Forecast error



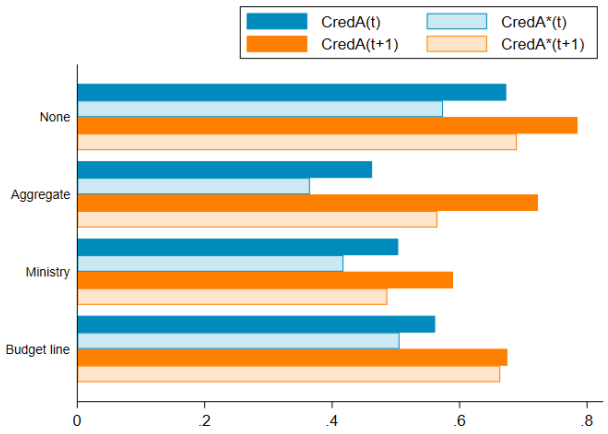
Notes: Blue dots for "core" economies, red circles for IMF programs, and green diamonds for Eastern European countries—these country groups are per appendix A. Dashed lines are linear regressions (per country type) and the shaded area in panel (b) is a quadratic interpolation with 95-percent confidence bands. Medium-term adjustments are taken from SCPs and annualized for comparability. Precisely, Medium-term adjustments are computed as $\Delta^{MT} \equiv (\mathbb{E}_t^o b_{i,t+h} - \mathbb{E}_t^o b_{i,t-1})/(h+1)$ with the largest h available. I also looked at fiscal adjustments planned for year $t+h$: $\Delta_{i,t}^{(h)} \equiv \mathbb{E}_t^o b_{i,t+h} - \mathbb{E}_t^o b_{i,t-1}$.

Figure 6: *Absolute* $(t+1)$*-credibility and institutional design*

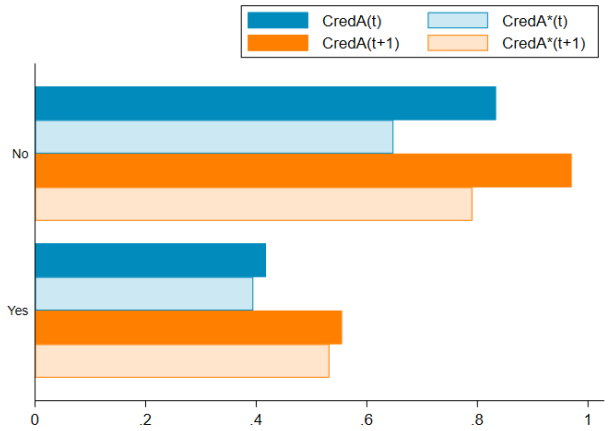
(a) How many fiscal rules are there?



(b) At what level are budget medium-term ceilings?



(c) Is there a fiscal council?



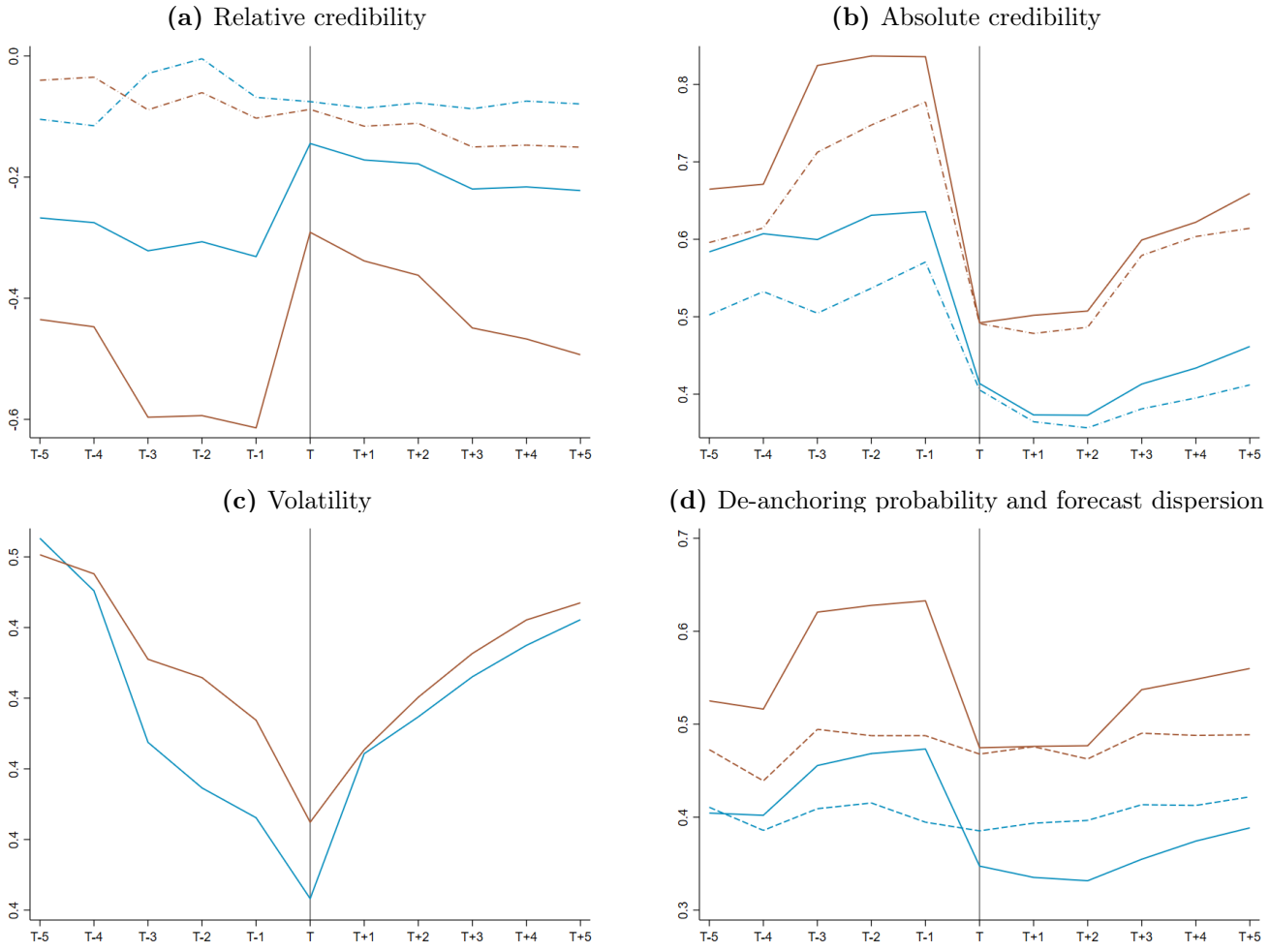
(d) Scope of independent fiscal institution's mandate

Notes: Blue and orange bars are respectively the average absolute t-credibility and $(t+1)$-credibility. Lighter-shaded bars are for cyclically-adjusted averages. The index on panel (d) is computed by the European Commission's Scope Index of Fiscal Institutions (SIFI), available for 2015-18.

and Wierts 2009). And private forecasters seem to trust less governments that have had large slippages (Figure 5f). Appendix D provides further analysis of the role of past fiscal performance, based on several possible "real time" measures.

The content of fiscal announcements seems to impact credibility: ambitious annual and medium-term adjustments are associated with more suspecting private expectations, except in program cases (Figure 5d). This result suggests that credibility is not only about sticking to one's commitments, it includes setting reasonable and realistic targets.

Figure 7: *Evolution around release of new official forecasts*

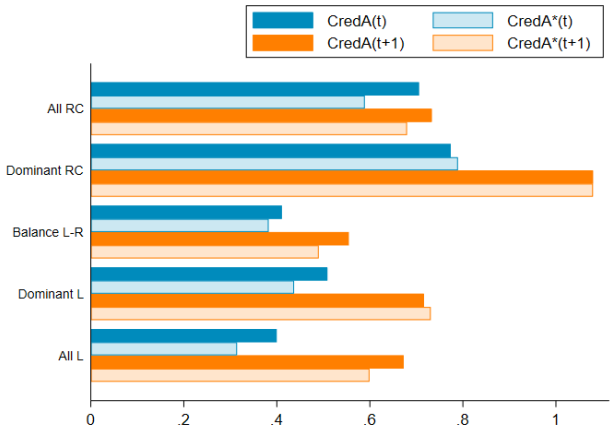


Notes: On the monthly x-axis, T labels the month when a new forecast is released by the government. Blue and orange lines are respectively for $h = 0$ and $h = 1$. Dashed lines represent cyclically-adjusted credibility on panels (a)-(b), and private forecast dispersion on panel (d).

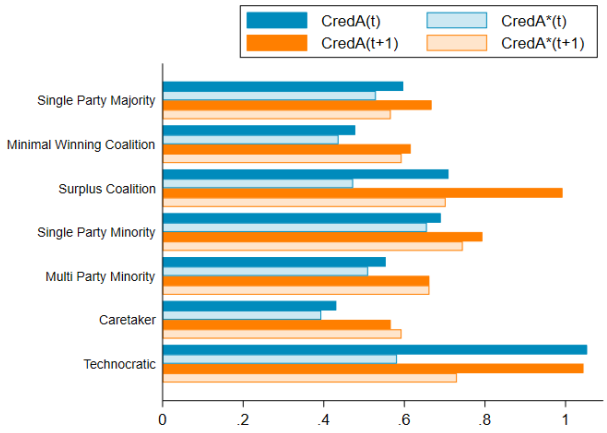
Announcements of fiscal targets should in themselves be a shock on market perceptions. The release of new fiscal plans clearly constitute statistical innovations for the credibility time series, whose impact is *a priori* ambiguous. One the one hand, the release of new official plans, updated to account for the

Figure 8: *Absolute $(t+1)$-credibility and political cycle*

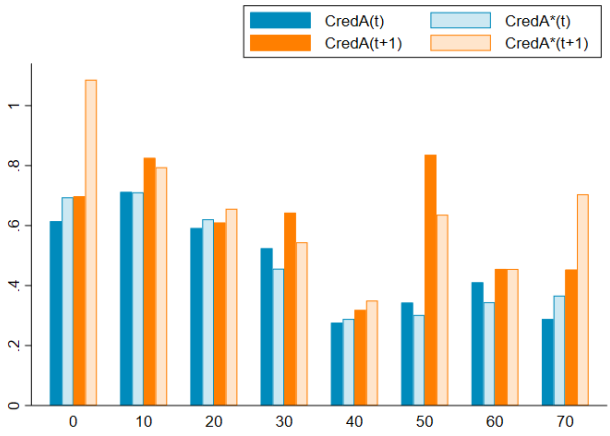
(a) Government's political orientation



(b) Type of government



(c) Share of people who trust politicians?



Notes: Blue and orange bars are respectively the average absolute t-credibility and $(t+1)$-credibility. Lighter-shaded bars are for cyclically-adjusted averages. L and R stand for left and right parties. Panel (c) relies on the shares of respondents to the European Social Survey who declare they rather trust their political representatives (not less than 5 on a scale from 0 to 10); the x-axis groups observations by deciles (e.g., the label "40" stands for a share between 40 and 50).

latest developments, could help re-anchor private expectations. On the other hand, the disclosure of new official targets could also add confusion if the communication surrounding them is poor. To shed some light on the role of announcements, I run a rudimentary event study analysis around official publication dates.[21] Credibility improves dramatically upon the release of new official plans and then slowly worsens (Figures 7a–7b). The volatility of credibility tends to decrease before the announcement is made, which could be because of political discussions and public debates helps crystallize private forecasters' opinions (Figure 7c). Official announcements thus help anchor expectations, even though they have no impact on

21. With the so-called European semester and the budget cycle, our indicators can follow seasonal patterns, too. This is what Appendix Figure F.1 examines. I find that within the year credibility is the weakest at the beginning of the year (when end-year forecasts are the most difficult because the furthest in the future) and during budget preparation.

the dispersion of private forecasts—the latter could then reflect an intrinsic assessment of government's ability to achieve targets (Figure 7d).

Last, I explore how fiscal credibility may be influenced by political cycles. As plotted in Appendix Figure F.3, elections do not necessarily de-anchor expectations, even though they are associated with somewhat higher levels of volatility in credibility. However, somewhat confirming the literature about the political economy of fiscal policy (e.g., Alesina et al. 1998), I find some associations between credibility and political variables (Figure 8). Unsurprisingly, credibility improves with trust in politicians; yet, too much trust also seems to be associated with lesser credibility, indicating that some level of distrust might be conducive of fiscal discipline. Governments that are more tilted towards left-wing parties also seem to inspire more credibility, although the optimal for credibility appears to be a government formed by a balanced mix of right- and left-wing representatives.

5 Empirical analysis

5.1 The determinants of fiscal credibility

Drawing from the bi-variate analysis conducted in the previous section, this section explores the relative role of the various factors that appear associated with fiscal credibility—as well as some further variables used tentatively as controls. Specifically, the multivariate empirical analysis presented in this section is based on panel estimations of the following equation:

$$ACred_{i,t}^{(h)} = \phi_{year(t)} + \psi_{month(t)} + \chi_i + \rho ACred_{i,t-1}^{(h)} + \beta X_{i,t} + u_{i,t} \tag{9}$$

where i and t index respectively countries and monthly dates.

On the left-hand side, I focus on absolute credibility at horizon $h = 1$ as my main measure of fiscal credibility. On the right-hand side, I assume it can be explained by seasonal patterns, persistence, and a vector of macroeconomic, political, and institutional determinants (X). Namely, the latter capture various dimensions: (1) initial macroeconomic conditions (public debt and deficit ratios, output gap, inflation) and the existence of an IMF program; (2) institutional setting, such as the level of economic development (captured by the per-capita GDP) and the existence of virtuous fiscal institutions; (3) plans and track record of fiscal policy; (4) political variables (political affiliation, electoral dummies—as Merola and Pérez (2012) does for forecast errors). In addition, to ascertain that $ACred$ does not simply measure economic uncertainty or a broader sentiment of confidence in the economy, I add to this list a country-specific uncertainty indicator (Ahir, Bloom, and Furceri 2018) and structural features, such as export quality and diversification (Henn, Papageorgiou, and Spatafora 2013), the composition of the deficit (tax burden,

quality of spending), and the composition of public debt (share held by residents or the central bank, share in foreign currency, to capture possible home bias or original sin).[22]

The specification in equation (9) is designed to identify determinants of fiscal credibility, that is the main signals that motivate professional forecasters to deviate consider official targets will not be achieved. However, the specification can hardly be exhaustive, nor represent a comprehensive, structural model of the formation of their forecasts. For this reason, I include a lavish number of fixed effects: country and year fixed effects to account for unobserved common factors, and monthly fixed effects to account for seasonality (alike Aaronson 2001). I check whether country fixed effects need to be included with a Hausman (1978) test; the null hypothesis that the difference in coefficients is not systematic is strongly rejected with a lower than 1 percent level coefficient for most regressions, confirming that fixed effects should be included for a consistent estimation. Likewise, year and seasonal fixed effects are in most cases called for by Wald tests, which clearly reject the null hypothesis that the corresponding coefficients are jointly nil. In addition, all my regressions include binary variables for elections, IMF program reviews, and the release of new official targets, which appeared to impact credibility in the previous section.

I allow for a relatively generic distribution of residuals. It is likely that residuals behave differently for each country—fiscal credibility being more volatile in some countries than others, in relation to past performance, type of economy, distribution of economic shocks, and strength of institutions. Hence, I test for the presence of heteroskedasticity, drawing from Greene (2012). Modified Wald tests show that the assumption of homoskedasticity is generally rejected. Furthermore, I test for autocorrelation, following the procedure suggested by Wooldridge (2010). Depending on the results, I address heteroskedasticity and serial correlation issues with running a feasible generalized least squares (FGLS) procedure and allowing first-order autoregressive (AR(1)) disturbances (Greene 2012). In other words, I allow that $u_{i,t} = \eta u_{i,t-1} + \epsilon_{i,t}$ where $\epsilon_{i,t} \sim \mathcal{N}(0; \sigma_i)$ are independent. I have also investigated the existence of cross-sectional dependence. With Breusch-Pagan LM tests, which fit better panels with a long time dimension like mine, the null that contemporaneous residuals are independent is sometimes rejected. Yet, this test is hardly informative, as my panel is unbalanced; plus, intuitively, it would be hard to justify that fiscal credibility spills from one country over to others.[23]

The main findings are presented in Table 1. The first column is a baseline specification; it confirms that credibility is persistent and that the release of new targets helps anchor expectations, but it shows that elections do not play a significant role. More surprisingly, the conclusion of an IMF program review is associated with less confidence in the government, possibly indicating that IMF -imposed targets are not necessarily credible.

Columns (2)–(9) introduce variables describing the macroeconomic environment. They confirm that credibility is harmed when the government runs a higher public debt or a larger deficit, but also when

22. All these structural variables are included to check whether the credibility indicator could capture a broader sentiment of confidence in the economy than simply in the policymaker.

23. And in any case, I cannot control explicitly for panel dependence, as my dataset is not balanced enough.

Table 1: *Main results: determinants of fiscal credibility*

	Base	Initial Conditions								Economic		Institutions		Policy					Combined
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Credibility in t-1	0.749***	0.746***	0.745***	0.748***	0.748***	0.774***	0.777***	0.771***	0.746***	0.751***	0.765***	0.711***	0.706***	0.746***	0.747***	0.764***	0.748***	0.739***	0.749***
	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.009]	[0.009]	[0.009]	[0.010]	[0.010]	[0.012]	[0.014]	[0.014]	[0.010]	[0.010]	[0.010]	[0.010]	[0.011]	[0.011]
Release of new target for t+1 (dummy)	-0.361***	-0.371***	-0.371***	-0.373***	-0.372***	-0.379***	-0.380***	-0.366***	-0.373***	-0.385***	-0.603***	-0.505***	-0.437***	-0.360***	-0.361***	-0.391***	-0.407***	-0.397***	-0.410***
	[0.021]	[0.021]	[0.021]	[0.021]	[0.021]	[0.022]	[0.022]	[0.021]	[0.021]	[0.023]	[0.029]	[0.032]	[0.030]	[0.021]	[0.021]	[0.022]	[0.023]	[0.025]	[0.024]
= 1 when election occurs	-0.019	-0.023	-0.023	-0.020	-0.021	-0.023	-0.023	-0.020	-0.019	-0.026	-0.033	-0.064	-0.049	-0.020	-0.019	-0.027	-0.022	-0.034	-0.030
	[0.026]	[0.026]	[0.026]	[0.026]	[0.026]	[0.027]	[0.027]	[0.027]	[0.026]	[0.028]	[0.038]	[0.047]	[0.045]	[0.026]	[0.026]	[0.028]	[0.030]	[0.032]	[0.030]
= 1 for IMF program approval/review completion	0.095**	0.083*	0.094**	0.088**	0.090**	0.087**	0.110**	0.104**	0.087**	0.093*	0.119**	-0.006	0.018	0.082*	0.082*	0.108**	0.111**	0.084*	0.083
	[0.044]	[0.045]	[0.044]	[0.044]	[0.044]	[0.043]	[0.043]	[0.043]	[0.044]	[0.052]	[0.060]	[0.069]	[0.053]	[0.045]	[0.045]	[0.044]	[0.048]	[0.044]	[0.052]
Public debt ratio in t-1 (in % GDP)		0.002***																	
		[0.001]																	
Primary balance in t-1 (% GDP; WEO)			-0.015***																0.012**
			[0.004]																[0.005]
Inflation in t (average yoy; %)				0.018***															
				[0.005]															
Inflation if higher than 4%					0.008**														
					[0.004]														
Output gap in t-1 (in %)						-0.010***													-0.006*
						[0.003]													[0.004]
Real GDP growth in t-1 (in %)							-0.007***												
							[0.003]												
ECB i-rate; main refinancing operation								-0.106***											-0.127***
								[0.029]											[0.031]
Real policy rate									-0.022***										
									[0.005]										
Resid share of public debt (percent)										-0.002**									0.001**
										[0.001]									[0.001]
Export quality index											4.388**								
											[2.178]								
Nation: Independent body sets budget assumptions												-0.127**							
												[0.054]							
Nation: Independent body monitors implementation													-0.067*						
													[0.035]						
Adjustment planned in t+1 (pp GDP)														0.011***					
														[0.004]					
Gov't medium term adjustment plan (pp GDP/year)															0.030**				0.054***
															[0.013]				[0.016]
Yearly average forecast error for t+1 (pp GDP)																0.026***			0.034***
																[0.004]			[0.005]
2yr-rolling for. error with first t+1 estimate (pp GDP)																		0.012***	
																		[0.004]	
Number of numerical fiscal rules																			0.013**
																			[0.007]
Constant	0.280***	0.150**	0.269***	0.251***	0.285***	0.276***	0.285***	0.271***	0.246***	0.428***	-4.122*	0.355***	0.353***	0.275***	0.272***	0.265***	0.258***	0.272***	0.146**
	[0.036]	[0.063]	[0.036]	[0.037]	[0.036]	[0.026]	[0.026]	[0.025]	[0.037]	[0.065]	[2.162]	[0.054]	[0.056]	[0.036]	[0.036]	[0.026]	[0.039]	[0.043]	[0.058]
Observations	3,895	3,831	3,831	3,831	3,831	3,831	3,831	3,895	3,831	3,331	2,275	1,833	2,019	3,895	3,895	3,571	3,223	2,938	3,055
Number of ccode	27	26	26	26	26	26	26	27	26	23	27	21	25	27	27	27	27	27	23
Fixed effects	CYM	CYM	CYM	CYM	CYM	YM	YM	YM	CYM	CYM	CYM	CYM	CYM	CYM	CYM	YM	CYM	CYM	YM
Heterosked	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Autocorr	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	0.000	0.000	0.001	0.000	0.001	1.000	0.110	1.000	0.000	0.000	0.000	0.071	0.030	0.000	0.000	0.246	0.041	0.014	0.809
Wald Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Wald M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000
Modif. Wald	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Breusch-Pagan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-1.000	-1.000	-1.000	0.000	0.000	0.000	0.000	-1.000	0.000
Serial	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Standard errors in brackets. ***, **, and * stand for significance at the 99, 95, and 90 percent confidence levels, respectively. Fixed effects `C`, `Y`, and `M` stand for country, year, and month. At the bottom of the table, `Hausman`, `Wald Y/M`, `Modif.Wald`, `Breusch-Pagan`, and `Serial` provide the p-values for the Hausman test of including country fixed effects, the Wald tests of including year (`Y`) and month (`M`) fixed effects, the modified Wald test of heteroskedasticity, the Breusch-Pagan test of cross-sectional dependence, and the test of serial correlation.

inflation is high, the growth rate is low, the economy runs below potential (*i.e.*, with a negative output gap), and monetary policy is accommodative (as signaled by a lower policy rate, in nominal or real terms).

Next, I turn to structural economic variables—to assert whether the fiscal credibility indicator might be driven by confidence in the economy rather than trust in the government. I find that credibility is only marginally influenced by the structure of public debt (column (10)). In particular, credibility improves slightly when public debt is owned to a larger extent by resident—the *home bias*, which for instance makes Japanese government bonds look safer than fundamentals would otherwise support. By contrast, I do not find any significant correlation between my credibility indicator and the structure of the economy, which proves that the former truly reflects the confidence in the government's announcements rather than the strength of the economy.[24]

As suspected from the literature and the stylized facts in sections 3–4, institutions can contribute to improve credibility; in particular, columns (12)–(13) show that having an independent fiscal council that sets macroeconomic assumptions for the budget and monitors budget implementation is associated with more credibility. These regressions also confirm that past policy performance and current policy plans have an impact on credibility (columns (14)–(18)). Governments having failed to perform according to plan in previous years are seen as less credible, as well as governments setting ambitious fiscal adjustments.

In a second stage, I combine these various factors into a single regression, so as to be able to compare the relative influence of each. The choice of predictors stems from the following selection procedure: within each category of variables (economic, political, institutional, *etc.*), I discard those for which there are less observations; I skim those providing redundant information by examining pairwise correlations; and I double check with an analysis of variance inflation factors, aiming for factors that do not exceed the common cutoff value of 10.[25] Results in column (19) confirm that credibility is influenced simultaneously by the macroeconomic environment, policy decisions, and the institutional setup. The most impacting factors seem to be policy variables (including monetary policy). This tends to prove two things: (1) the credibility indicator developed in this paper truly captures the agents' responses to policy announcements and track record (rather than a broader sentiment of confidence); and (2) institutions, such as fiscal rules and fiscal councils, do not *per se* have a sizable impact and are rather likely to operate through their role in changing policymaking practices (hence, through their impact on track record and quality of budget plans and implementation).[26]

In a third stage, recognizing that model selection may impact the statistical properties of my results so far, I run a Bayesian model averaging estimation (Magnus and Durbin 1999; Danilov and Magnus 2004). Namely, instead of estimating selected forms of equation (9), I compute a weighted average of all conditional estimates obtained by varying X over the possible combinations of explanatory variables,

24. I just find a weak, negative correlation between credibility and export quality (column (11)), which looks spurious.
25. Even though multicollinearity is usually not considered a major issue for panel analysis.
26. The combined regression in Table 1 even suggests that having too many fiscal rules could be counterproductive.

because each of these variants may contain information about the true data-generating process.[27] Since my dataset and the number of candidate variables are large, I rely on the weighted-average least-square estimator developed by Magnus, Powell, and Prüfer (2010). Such a Bayesian model-averaging technique accounts for the uncertainty of both estimation and model selection.

Results can be found in Table 2, with two alternative prior distributions; they are broadly in line with non-Bayesian estimations. Further, Bayesian estimates show that fiscal rules have a stronger impact when they are softer—national rather than supranational, and political rather than constitutional—, which probably explains why credibility did not seem to improve after the global financial crisis (GFC), despite the various reforms of the SGP.[28] One exception is expenditure ceilings, which seem to work better when they are defined at a more disaggregated level. To explain this, I postulate that credibility-enhancing institutional features, such as fiscal rules or fiscal agencies, could result from a self-selection bias: only already ill-behaved governments may be led to establishing such constraining counter-powers.

The interaction between various variables is also interesting. For instance, inflation comes out as having a non-linear effect, in the sense that some inflation is good for credibility, but not too much. Likewise, private agents seem to trust more governments who have an ambitious multiyear adjustment objective, but not when it is front-loaded. They are deterred by downside revisions and forecast errors. Political variables, such as the political orientation of the ruling party or the parliamentarian support of the government, and macroeconomic uncertainty and structural parameters seem to matter as little with Bayesian estimation as with traditional estimators.[29]

Several robustness checks vouch for the findings of this section. First, when I use the credibility indicator with a shorter horizon ($h = 0$), results remain similar, confirming that what my indicator capture is somewhat independent of the forecast horizon (Table H.4 in appendix H). The main noticeable difference is that the composition of public debt and the economic structure, play an even lesser role for short-term credibility; but fiscal rules contribute more to short-term credibility. Second, I run the same regressions with cyclically-adjusted credibility, to check that results are not driven by pro-cyclical fluctuations of market sentiment. As can be seen on Table H.6, they are not, except at the margin for the impact of an IMF program (which becomes significant) and that of economic resilience (export quality and debt composition lose significance). This is possibly because IMF programs usually intervene when an economy goes beyond the *normal* cyclical downturn. Third, adding another lag to the baseline regression helps to verify that allowing the residuals to be autocorrelated and including time fixed effects are sufficient to control of serial correlation, as it does not alter results substantially (Table H.5). Fourth, as some of the

27. I actually impose the lagged endogenous variable, fixed effects, and dummies for IMF program, elections, and new target release dates to be always included in the model. All other regressors are deemed auxiliary, because I am not sure about whether they need be included. Hoeting et al. (1999) provides a more detailed discussion of model-averaging estimation.

28. On the contrary, the GFC and the subsequent European debt crisis might have whetted markets' scrutiny over fiscal policy.

29. I consider an auxiliary regressor to be significantly correlated with credibility when its t-ratio is greater than one in absolute value, *i.e.* when the one-standard error confidence band does not cover zero.

Table 2: *Bayesian estimations*

	Neutral Laplace prior			Neutral Subbotin prior		
	Coef.	Std.Err.		Coef.	Std.Err.	
Credibility in t-1	0.645	0.0233	**	0.645	0.0234	**
Release of new target for t+1 (dummy)	-0.603	0.0729	**	-0.602	0.0730	**
= 1 when election occurs	-0.0371	0.0912		-0.0375	0.0911	
(mean) IMF prog. review	0.257	0.199	**	0.260	0.199	**
Public debt ratio in t-1 (in % GDP)	-0.00107	0.00669		-0.00105	0.00705	
Primary balance in t-1 (% GDP, WEO)	0.189	0.0619	**	0.193	0.0666	**
Inflation in t (average yoy, %)	-0.122	0.0576	**	-0.138	0.0596	**
Inflation if higher than 4%	0.0480	0.0377	**	0.0523	0.0392	**
Output gap in t-1 (in %)	0.00556	0.0345		0.00196	0.0340	
Real GDP growth in t-1 (in %)	0.0294	0.0287	**	0.0265	0.0285	
Sovereign yield (10 yr, Bloomberg)	0.0353	0.0326	**	0.0382	0.0327	**
ECB i-rate, main refinancing operation	-0.119	0.0734	**	-0.110	0.0745	**
IMFprog	0.0619	0.122		0.0518	0.123	
FCU share of public debt (percent)	-0.0133	0.00894	**	-0.0144	0.00898	**
CB share of public debt (percent)	-0.255	0.140	**	-0.266	0.146	**
Resid share of public debt (percent)	-0.00156	0.00976		-0.00295	0.00984	
Export diversification index	-0.241	0.324		-0.205	0.323	
Export quality index	1.921	12.91		1.259	12.83	
Log GDP per capita	-2.075	1.436	**	-2.369	1.515	**
Number of numerical fiscal rules	0.163	0.136	**	0.147	0.139	**
Expenditure rule at the national level (1), supranational level (2), or both (3)	-0.0822	0.141		-0.0742	0.142	
Revenue rule at the national level (1), supranational level (2), or both (3)	0.356	0.245	**	0.429	0.248	**
Budget balance rule at the national level (1), supranational level (2), or both	-0.175	0.187		-0.176	0.187	
Multiyear expenditure ceiling (1= aggregate, 2= ministry, 3=budget item)	-0.197	0.0911	**	-0.211	0.0923	**
FR: legal basis	1.070	0.285	**	1.152	0.293	**
Uncertainty index	0.483	0.531		0.442	0.524	
Political color of government (Schmidt index; R, C, L for right, center, left)	-0.0145	0.138		-0.00890	0.124	
Type of government	0.0160	0.0293		0.0184	0.0288	
Share of gov't from Left party	0.00124	0.00564		0.00115	0.00507	
Adjustment planned in t+1 (pp GDP)	0.0900	0.0372	**	0.0966	0.0388	**
Gov't medium term adjustment plan (pp GDP/year)	-0.394	0.152	**	-0.422	0.158	**
Yearly average gov't latest revision for t+1 estimate (pp GDP)	-0.110	0.0594	**	-0.112	0.0633	**
2yr-rolling gov't latest revision for t+1 estimate (pp GDP)	-0.00401	0.0540		-0.00686	0.0571	
24m-rolling gov't latest revision for t+1 estimate (pp GDP)	-0.160	0.0445	**	-0.163	0.0467	**
Yearly average forecast error for t+1 (pp GDP)	0.222	0.0688	**	0.229	0.0745	**
Yearly average for. error with first t+1 estimate (pp GDP)	-0.0243	0.0267		-0.0282	0.0271	**
2yr-rolling for. error with first t+1 estimate (pp GDP)	0.0503	0.0345	**	0.0518	0.0347	**
Constant	12.80	17.53		15.88	17.93	
Observations	850			850		

Notes: The dependent variable is $ACred_{i,t}^{(1)}$; month, country, and year fixed-effects are included. ** stands for a t-ratio greater than one in absolute value.

exogenous variables are produced only annually, I run the same regressions on a yearly basis (Table H.7).[30] As expected, slow-moving factors, such as fiscal institutions or average past errors or revisions, turn out as more significantly associated with credibility than in the baseline monthly regression.

5.2 The benefits of credibility

Fiscal credibility can be expected to have several beneficial macroeconomic effects. First, a credible government, by convincing markets about its fiscal policy, should be able to access better financing conditions. Second, fiscal credibility should foster a virtuous sentiment of confidence, which in turn should stimulate demand through higher investment and higher consumption. Under more trust and certainty, agents need to accrue less precautionary savings. Therefore, credibility should contribute to higher GDP growth. This growth should translate into more robust tax revenues, which, together with better financing terms, should help to improve fiscal outturns. By contraposition, when agents mistrust the government, they might delay consumption and investment in favor of precautionary savings, and possibly resort to informality.[31] This might erode tax bases and tax morale, making it more likely for governments to miss their fiscal targets, and fuel mistrust further.

This section empirically examines how credibility impacts fiscal and macroeconomic performance. It runs the following fixed-effect panel regressions, where credibility is now on the right-hand side of the equation, with a lag:

$$Z_{i,t}^{(h)} = \left\langle Cred_{i,s}^{(1)} \right\rangle_{s \in t-1} + \alpha_i + \beta_t + \eta_{i,t} \tag{10}$$

Several endogenous variables Z are considered successively. Since not all these variables are available on a monthly basis, average credibility over the corresponding period of time is used as main explanatory variable. Hence, t is a time index that can be either monthly, quarterly, or yearly, depending on the frequency of the endogenous variable. The empirical approach follows closely that of the previous subsection—except that here there are less variables of interest on the right-hand side. Admittedly, this specification may omit some determinants, but the abundant fixed effects and the AR(1) residuals should mostly capture. It provides insights, in terms of correlations rather than causality, on how the various credibility indicators I have developed in this paper (or the variation thereof) relate to macro-fiscal performance. Relative credibility $Cred$ is also included in some regressions, to see whether there could be some non-linear effects between situations where markets are more pessimistic than governments, and situations where they are more optimistic.

30. Namely, the specification is: $ACred_{i,y}^{(h)} = \phi_y + \chi_i + \rho ACred_{i,y-1}^{(h)} + \beta X_{i,y} + \epsilon_{i,y}$, where i, y index countries and years, and $ACred_{i,y}^{(h)} \equiv \left\langle ACred_{i,t}^{(h)} \right\rangle_{t \in y}$ is the annual average of fiscal credibility. The sample is then much reduced on its time dimension (which is now broadly similar to the cross-section dimension), and unbalanced. Hence, I follow the same estimation procedure based on an FGLS as in the previous section.

31. The literature on informality finds a clear link between lack of trust in governments and institutions and the extent of informal activity.

Table 3: *Fiscal credibility and monthly outcomes*

	Sov. CDS								Sov. yield (2 years)								Sov. yield (10 years)			Rating			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
Lag endogenous	0.836***	0.894***	0.883***	0.894***	0.882***	0.875***	0.862***	0.880***	0.960***	0.962***	0.962***	0.960***	0.968***	0.961***	0.960***	0.961***	0.970***	0.970***	0.971***	0.988***	0.988***	0.993***	0.999***
	[0.015]	[0.007]	[0.011]	[0.008]	[0.011]	[0.010]	[0.014]	[0.014]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.004]	[0.004]	[0.004]	[0.002]	[0.002]	[0.002]	[0.000]
Lagged credA_t	2.382**								0.019**														
	[1.103]								[0.008]														
Lagged change in credA_t		1.344**								0.019**							0.019**			-0.004**			
		[0.535]								[0.009]							[0.009]			[0.002]			
Lagged credA_t1			0.858**																				
			[0.421]																				
Lagged change in credA_t1				1.420***							0.016**												
				[0.466]							[0.007]												
Lagged credA_ca_t					1.454*																		
					[0.746]																		
Lagged change in credA_ca_t						1.286**															-0.005**		
						[0.566]															[0.002]		
Lagged credA_ca_t1												0.013*											
												[0.007]											
Lagged credV_t							6.423***																
							[2.243]																
Lagged credV_t1								3.916**															
								[1.945]															
Lagged change in credV_t1													-0.072**										
													[0.033]										
Lagged priv_sd_t1																						-0.010*	
																						[0.006]	
Lagged credR_t														0.042***				0.032**					
														[0.015]				[0.014]					
Lagged credR_t if < 0														-0.056***				-0.033*					
														[0.019]				[0.018]					
Lagged change in credR_t																			-0.024**				-0.000
																			[0.011]				[0.003]
Lagged change in credR_t if < 0																			0.027*				0.006*
																			[0.016]				[0.003]
Lagged credR_t1															0.032**								
															[0.013]								
Lagged credR_t1 if < 0															-0.036**								
															[0.015]								
Lagged change in credR_t1																0.013							
																[0.010]							
Lagged change in credR_t1 if < 0																-0.032***							
																[0.013]							
Constant	4.498	4.078***	3.656**	4.048***	3.622*	4.754***	1.498	1.963	-0.009	-0.004	-0.005	-0.011	-0.017*	-0.010	-0.010	-0.005	-0.030*	-0.034*	-0.031*	0.192***	0.190***	0.110***	0.018**
	[4.767]	[1.297]	[1.633]	[1.267]	[1.991]	[1.517]	[4.497]	[3.759]	[0.015]	[0.015]	[0.015]	[0.016]	[0.010]	[0.015]	[0.015]	[0.015]	[0.018]	[0.018]	[0.018]	[0.040]	[0.040]	[0.036]	[0.008]
Observations	3,337	3,319	3,323	3,303	3,337	3,319	3,121	3,083	2,451	2,442	2,427	2,421	2,295	2,451	2,438	2,427	2,855	2,866	2,855	3,883	3,883	3,450	3,883
Number of ccode	25	25	25	25	25	25	25	25	17	17	17	17	17	17	17	17	21	21	21	27	27	18	27
Fixed effects	C	C	C	C	C	C	C	C	YM	YM	YM	YM	Y	YM	YM	YM	YM	YM	YM	CY	CY	CYM	Y
Heterosked	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Autocorr	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.947	0.947	0.967	0.964	0.603	0.932	0.927	0.927	0.971	0.906	0.906	0.000	0.000	0.021	0.695
Wald Y	0.439	0.439	0.374	0.374	0.345	0.345	0.399	0.334	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Wald M	0.493	0.493	0.476	0.476	0.476	0.476	0.477	0.470	0.052	0.052	0.044	0.045	0.117	0.050	0.042	0.042	0.000	0.000	0.000	0.599	0.677	0.022	0.452
Modif. Wald	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Breusch-Pagan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Serial	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Same conventions for the statistical tests as in Table 1. Beyond, `credA` is the absolute credibility *ACred*, `credR` the relative credibility *Cred*, `credV` the volatility of credibility over time *Vol*, and `priv_sd` the dispersion of private forecasts *SdCred*. `ca` denotes cyclically-adjusted credibility indicators, while `t` and `t1` are for $h = 0$ and $h = 0$, respectively. `X if < 0` is the variable X interacted with the dummy $\mathbb{I}_{X<0}$.

Table 4: *Fiscal credibility and quarterly outcomes*

	GDP growth						Investment growth			Priv. cons. growth	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Lag endogenous	0.000	-0.058*	0.029	-0.009	-0.001	-0.008	-0.179***	-0.177***	-0.151***	-0.553***	-0.462***
	[0.031]	[0.032]	[0.032]	[0.031]	[0.031]	[0.031]	[0.047]	[0.047]	[0.045]	[0.029]	[0.030]
Lagged credA_ca_t1	-0.105***										
	[0.036]										
Lagged credV_t1		-0.168**									
		[0.083]									
Lagged priv_sd_t							-1.086***				
							[0.402]				
Lagged priv_sd_t1			-0.152*					-1.113**		-0.456***	
			[0.085]					[0.444]		[0.169]	
Lagged change in credR_t									-0.541***		0.052
									[0.186]		[0.041]
Lagged change in credR_t if < 0									0.422*		-0.105*
									[0.247]		[0.062]
Lagged change in credR_t1				-0.146**							
				[0.063]							
Lagged change in credR_t1 if < 0				0.169**							
				[0.074]							
Lagged credR_ca_t					-0.129**						
					[0.055]						
Lagged credR_ca_t if < 0					0.143*						
					[0.076]						
Lagged credR_ca_t1						-0.191***					
						[0.047]					
Lagged credR_ca_t1 if < 0						0.232***					
						[0.071]					
Constant	0.331***	0.377***	0.563**	0.297**	0.303**	0.320***	1.331*	1.406**	-0.072	1.181***	0.582***
	[0.123]	[0.126]	[0.232]	[0.122]	[0.122]	[0.123]	[0.697]	[0.700]	[0.502]	[0.173]	[0.114]
Observations	1,239	1,132	1,094	1,216	1,248	1,239	481	481	520	872	1,031
Number of ccode	26	26	17	26	26	26	6	6	9	14	22
Fixed effects	YQ	YQ	CYQ	YQ	YQ	YQ	YQ	YQ	YQ	C	Y
Heterosked	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Autocorr	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	1.000	1.000	0.003	1.000	1.000	0.124	1.000	1.000	1.000	0.002	1.000
Wald Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.228	0.000
Wald Q	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.003	0.000	0.549	0.284
Modif. Wald	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Breusch-Pagan	-1.000	-1.000	0.000	-1.000	-1.000	-1.000	0.000	-1.000	0.000	0.000	0.125
Serial	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000

Notes: Same conventions as Table 3.

Table 5: *Fiscal credibility and annual outcomes*

	GDP growth								Investment growth			$\hat{C}$	Public debt ratio						Primary bal.				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
Lag endogenous	0.345***	0.279***	0.353***	0.440***	0.532***	0.392***	0.395***	0.447***	0.542***	0.507***	0.498***	0.282***	0.832***	0.833***	1.003***	0.867***	0.862***	0.837***	0.562***	0.714***	0.781***	0.558***	0.558***
	[0.052]	[0.051]	[0.052]	[0.049]	[0.044]	[0.055]	[0.056]	[0.050]	[0.064]	[0.063]	[0.064]	[0.056]	[0.029]	[0.028]	[0.006]	[0.027]	[0.030]	[0.029]	[0.033]	[0.039]	[0.035]	[0.035]	[0.034]
Lagged credA_t													0.825**										
													[0.350]										
Lagged change in credA_t	-0.266**																						
	[0.114]																						
Lagged credA_ca_t		-0.279*										-0.288*							0.517***				
		[0.149]										[0.173]							[0.132]				
Lagged change in credA_ca_t			-0.353***																				
			[0.117]																				
Lagged credA_ca_t1				-0.459***										0.645*									
				[0.169]										[0.337]									
Lagged change in credA_ca_t1					-0.503***																		
					[0.144]																		
Lagged credV_t1															0.978*								
															[0.561]								
Lagged change in priv_sd_t						-0.701***																	
						[0.256]																	
Lagged priv_sd_t1																2.573***				-0.659**			
																[0.760]				[0.334]			
Lagged change in priv_sd_t1							-0.885**										1.448**				-1.150***		
							[0.417]										[0.666]				[0.370]		
Lagged credR_t									0.956													0.288	
									[0.634]													[0.217]	
Lagged credR_t if < 0									-1.652*													-0.675**	
									[0.986]													[0.284]	
Lagged change in credR_t										-0.021													
										[0.471]													
Lagged change in credR_t if < 0										-1.350**													
										[0.575]													
Lagged change in credR_t1											0.529												
											[0.461]												
Lagged change in credR_t1 if < 0											-1.050**												
											[0.471]												
Lagged credR_ca_t																							0.347*
																							[0.191]
Lagged credR_ca_t if < 0																							-0.815***
																							[0.271]
Lagged change in credR_ca_t																		0.288					
																		[0.281]					
Lagged change in credR_ca_t if < 0																		-0.852**					
																		[0.417]					
Lagged credR_ca_t1								-0.364*															
								[0.209]															
Lagged credR_ca_t1 if < 0								0.717**															
								[0.318]															
Constant	4.258***	2.693***	0.864	1.845***	0.154	4.092***	1.930***	4.870***	-15.656***	-15.688***	-15.250***	-5.505***	7.720***	6.985***	-3.543***	7.313***	7.303***	10.375***	-0.427	0.997**	0.941**	-0.667	-0.395
	[0.521]	[0.656]	[0.569]	[0.656]	[0.556]	[0.512]	[0.567]	[0.475]	[0.888]	[0.852]	[0.849]	[0.369]	[1.923]	[2.026]	[1.319]	[1.787]	[1.950]	[1.944]	[0.460]	[0.483]	[0.451]	[0.488]	[0.467]
Observations	282	308	282	308	282	258	258	308	189	176	176	327	308	308	280	276	258	282	308	276	258	308	308
Number of ccode	26	26	26	26	26	18	18	26	13	13	13	26	26	26	26	18	18	26	26	18	18	26	26
Fixed effects	CY	CY	CY	Y	Y	CY	CY	Y	Y	Y	Y	CY	CY	CY	Y	CY	CY	CY	Y	Y	Y	Y	Y
Heterosked	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Autocorr	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	0.029	0.004	0.004	0.998	0.998	0.071	0.027	0.478	0.998	0.998	0.996	0.001	0.002	0.004	0.108	0.000	0.000	0.017	0.792	0.436	0.436	0.999	0.332
Wald Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Modif. Wald	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Breusch-Pagan	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
Serial	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.004	0.000	0.000	0.000	0.005	0.004	0.000	0.000	0.001	0.001

Notes: Same conventions as Table 3. $\hat{C}$ stands for private consumption growth.

I find a strong confirmation of my working conjecture that credibility affects market perception and price of sovereign risk. Better credibility, as proxied by many of the indicators developed in this paper, is significantly associated with lower sovereign CDS spreads, as can be seen in columns (1)–(9) of Table 3. It is also strongly correlated to lower sovereign yields, for short maturities (columns (10)–(20)) as well as longer tenors (regressions (21)–(24)). It seems to also come with somewhat better ratings ((25)–(29)).[32] As evidenced by regressions where I introduce a non-linear term, these effects are stronger when $Cred$ is negative; in other words, markets penalize more strongly governments that are too optimistic than those who are too pessimistic, compared with the markets' own expectations.

I also find evidence that credibility and macroeconomic performance are related (Tables 4–5). Higher credibility is associated with higher GDP growth: one can see how better credibility indicators are associated with higher growth in columns (1)–(6) of Table 4 and (1)–(9) of Table 5. This seems to stem from higher investment (Table 4:(7)–(9); Table 5:(10)–(13)), as well as from higher private consumption (although the latter effect is not as strong) This result is quite robust, at it is picked up with several credibility indicators, at the annual as well as quarterly frequency, and for credibility levels as well as changes in credibility. In particular, indicators of dispersion, which relates to the uncertainty that underlies a lack of credibility, seem to be significantly associated with lower growth, investment, and consumption.

Last, I find some evidence about the impact of credibility on fiscal performance. The debt ratio seems to be smaller for countries where fiscal credibility is better (Table 5:(14)–(21)). Looking at the components of the debt ratio, I find that this can be easily explained by higher growth and smaller interest rates (*i.e.*, smaller $r-g$). On the other hand, evidence of the impact on the primary balance is mixed, possibly because this channel is less direct and possibly undetermined (as a government being seen as more credible can maybe afford somewhat larger deficits).

6 Conclusion

This paper fills a gap in the literature by providing an explicit measure of fiscal credibility. The quantitative indicators of fiscal credibility it develops cover 26 European countries and the 1995–2019 period on a monthly frequency. Moreover, the methodology can be easily replicated to other countries. Other complementary sources of data could be leveraged. J. Frankel (2011) collected official forecast of macro-fiscal variables for 33 countries, covering 1985–2011 and including real GDP and fiscal balance. Alternatively, such forecasts can be found in national budget documents. For private expectations, it should be possible to extract forecasts from the publications of research institutes, think tanks, and ratings agencies, using text mining techniques. Other indicators of market sentiment towards the government could

32. As an indicator of sovereign credit ratings, I follow Afonso, Furceri, and Gomes (2012)'s methodology and transform ratings by the main credit agencies (DBRS, Fitch, Moody's, and S&P) into a discrete numerical variable, AAA being the highest value. My only innovation is to add (subtract) 0.5 when the outlook is positive (negative).

also be envisaged, for example by parsing tweets or the specialized press and media—yet, this would likely lead to a qualitative, rather than quantitative, indicator of perceptions.

This paper provides useful stylized facts about the average credibility of European countries and about the dynamics of fiscal credibility. Agents are more wary about some countries than others, and such sentiment tends to persist over time. I find that credibility is influenced simultaneously by the macroeconomic environment, policy decisions, government's past record, and the institutional setup. Among all these factors, the most influential ones are policy-related: credibility erodes when the government runs a higher public debt or a larger deficit, when there have been larger slippages in the past, and when planned fiscal adjustment is more ambitious. Institutions, such as fiscal rules and fiscal councils that sets macroeconomic assumptions for the budget and monitors budget implementation, can contribute to improve credibility, but more as a catalyst of reasonable policy than by themselves.

I find that my indicator of fiscal credibility is correlated with the market valuation of sovereign risk, but also with macroeconomic performance. This last finding indicates that governments should strive to build and maintain credibility, by means of better institutions, more prudent forecasts, and regular communication about progress towards targets. A credible government might even trigger a virtuous circle, if its credibility is conducive of more investment and less precautionary savings, thereby boosting growth and placing the government in a better position to meet its fiscal targets.

For the policy- and law-makers, these findings have deep implications. First, it means that their track record are crucial to build a precious sentiment of confidence in their fiscal decisions. Most officials consider the budget a mere political vehicle, where packaging and broad policy intentions are more important than content. They should be more careful in drafting and implementing budget laws. A systematic optimistic bias can for instance cost valuable credibility. Second, credibility-enhancing institutions can contribute to, but not replace such a careful approach in restoring or maintaining fiscal credibility. Ideally, such fiscal institutions should be designed in such a way that forces governments to account for the long-term consequences of their fiscal choices in terms of fiscal credibility, and *in fine* of fiscal performance. Third, adopting a good communication and accountability framework could possibly provide better results than setting up *ad hoc* institutions (especially when the latter are purely formal).[33]

These policy implications are even more stringent in times of crisis, as it is crucial to prevent credibility from eroding in the face of adverse shocks. For instance, in response to the CoViD-19 shock, most countries suspended their normal macroeconomic policy frameworks, such as their fiscal rules or bans on central banks' direct financing of governments. While extreme circumstances call for unorthodox policies, most governments have not publicly addressed the heightening medium-term risks for public debt sustainability. For the sake of limiting the damage on fiscal credibility, even after market risk pricing normalizes, authorities should rapidly devise and communicate an exit strategy out of these extraordinary policies. They could also rely more on state-contingent policy instruments, alike countercyclical macroprudential policy

33. The IMF three pillars of good monetary policymaking are independence, accountability, and transparency. Clearly, devolving fiscal responsibilities to an independent, non-elected agency is unthinkable.

tools; for instance, by issuing indexed debt or by having budget rules to mechanically change some budget or tax items depending on cyclical developments. Being (seen as) credible could be the long-sought-after key to expansionary fiscal contractions.

References

Aaronson, Daniel. 2001. "Price pass-through and the minimum wage." *Review of Economics and statistics* 83 (1): 158–169.

Afonso, António, Davide Furceri, and Pedro Gomes. 2012. "Sovereign credit ratings and financial markets linkages: application to European data." *Journal of International Money and Finance* 31 (3): 606–38.

Ahir, Hites, Nicholas Bloom, and Davide Furceri. 2018. *The world uncertainty index.* Stanford mimeo.

Alesina, Alberto, Roberto Perotti, José Tavares, Maurice Obstfeld, and Barry Eichengreen. 1998. "The political economy of fiscal adjustments." *Brookings Papers on Economic Activity* 1998 (1): 197–266.

Armingeon, Klaus, Virginia Wenger, Fiona Wiedemeier, Christian Isler, Laure Knöpfel, and David Weisstanner. 2019. *Supplement to the Comparative Political Data Set—Government Composition 1960–2017.* Bern: Institute of Political Science, University of Berne.

Armingeon, Klaus, Virginia Wenger, Fiona Wiedemeier, Christian Isler, Laure Knöpfel, David Weisstanner, and S Engler. 2019. *Comparative Political Data Set 1960–2017.* Bern: Institute of Political Science, University of Berne.

Baker, Scott R, Nicholas Bloom, and Steven J Davis. 2016. "Measuring economic policy uncertainty." *The quarterly journal of economics* 131 (4): 1593–1636.

Beetsma, Roel, Xavier Debrun, Xiangming Fang, Young Kim, Victor Lledo, Samba Mbaye, and Xiaoxiao Zhang. 2019. "Independent fiscal councils: Recent trends and performance." *European Journal of Political Economy* 57:53–69.

Beetsma, Roel, Massimo Giuliodori, and Peter Wierts. 2009. *Budgeting Versus Implementing Fiscal Policy in the EU.* SSRN Scholarly Paper ID 1433882. Rochester, NY: Social Science Research Network.

Bornhorst, Fabian, Gabriela Dobrescu, Annalisa Fedelino, Jan Gottschalk, and Taisuke Nakata. 2011. "When and how to adjust beyond the business cycle? A guide to structural fiscal balances." IMF *Technical Notes and Manuals* 11 (2).

Buchanan, James M. 1976. "Barro on the Ricardian equivalence theorem." *Journal of political economy* 84 (2): 337–342.

Cadot, Olivier, Céline Carrère, and Vanessa Strauss-Kahn. 2011. "Export diversification: what's behind the hump?" *Review of Economics and Statistics* 93 (2): 590–605.

Capistrán, Carlos, and Manuel Ramos-Francia. 2010. "Does inflation targeting affect the dispersion of inflation expectations?" *Journal of Money, Credit and Banking* 42 (1): 113–34.

Christoffersen, Peter F, and Francis X Diebold. 1997. "Optimal prediction under asymmetric loss." *Econometric theory* 13 (6): 808–17.

Collard, Fabrice, Michel Habib, and Jean-Charles Rochet. 2013. *How can governments borrow so much?* Technical report. Toulouse School of Economics.

Cukierman, Alex, and Allan H. Meltzer. 1986. "A theory of ambiguity, credibility, and inflation under discretion and asymmetric information." *Econometrica* 54 (5): 1099–128.

Danilov, Dmitry, and Jan R Magnus. 2004. "On the harm that ignoring pretesting can cause." *Journal of Econometrics* 122 (1): 27–46.

Danninger, Stephan, Annette Kyobe, and Marco Cangiano. 2005. *The political economy of revenue-forecasting experience from low-income countries.* International Monetary Fund.

Debrun, Xavier, Tidiane Kinda, Teresa Curristine, Luc Eyraud, Jason Harris, and J Seiwald. 2013. "The functions and impact of fiscal councils." IMF *Policy Paper* 16.

Demertzis, Maria, Massimiliano Marcellino, and Nicola Viegi. 2012. "A credibility proxy: Tracking US monetary developments." *The BE Journal of Macroeconomics* 12 (1).

Dovern, Jonas, Ulrich Fritsche, and Jiri Slacalek. 2012. "Disagreement among forecasters in G7 countries." *Review of Economics and Statistics* 94 (4): 1081–96.

End, Nicolas. forthcoming. *The prince and me: a model of fiscal credibility.* Working Paper xx. AMSE.

Forni, Mario, and Luca Gambetti. 2010. *Fiscal Foresight and the Effects of Government Spending.* Center for Economic Research (RECent) 049. University of Modena and Reggio E., Dept. of Economics "Marco Biagi", June.

———. 2016. "Government spending shocks in open economy VARs." *Journal of International Economics* 99:68–84.

Frankel, Jeffrey. 2011. "Over-optimism in forecasts by official budget agencies and its implications." *Oxford Review of Economic Policy* 27 (4): 536–562.

Frankel, Jeffrey A, and Jesse Schreger. 2016. *Bias in official fiscal forecasts: can private forecasts help?* Technical report. National Bureau of Economic Research.

Frankel, Jeffrey, and Jesse Schreger. 2013. "Over-optimistic official forecasts and fiscal rules in the eurozone." *Review of World Economics* 149 (2): 247–72.

Fujiwara, Ippei, and Yuichiro Waki. 2017. *Fiscal Forward Guidance: A case for selective transparency.* Technical report 17087. Research Institute of Economy, Trade and Industry (RIETI), June.

Greene, William H. 2012. *Econometric analysis.* 7th edition. Upper Saddle River, NJ: Prentice Hall.

Hausman, Jerry A. 1978. "Specification tests in econometrics." *Econometrica: Journal of the econometric society:* 1251–71.

Henn, Christian, Chris Papageorgiou, and Nicola Spatafora. 2013. *Export quality in developing countries.* IMF Working Paper 13/108. Washington, D.C.

Hoeting, Jennifer A, David Madigan, Adrian E Raftery, and Chris T Volinsky. 1999. "Bayesian model averaging: a tutorial." *Statistical science:* 382–401.

Im, Kyung So, M Hashem Pesaran, and Yongcheol Shin. 2003. "Testing for unit roots in heterogeneous panels." *Journal of econometrics* 115 (1): 53–74.

International Monetary Fund. 2018. "Chapter 3. Challenges for Monetary Policy in Emerging Markets as Global Financial Conditions Normalize." Chap. 3 in *World Economic Outlook, October 2018 : Challenges to Steady Growth,* 101–25. Washington, D.C.: International Monetary Fund.

King, Mervyn. 1995. "Credibility and monetary policy: theory and evidence." *Scottish Journal of Political Economy* 42.

Kumar, Saten, Hassan Afrouzi, Olivier Coibion, and Yuriy Gorodnichenko. 2015. *Inflation targeting does not anchor inflation expectations: Evidence from firms in New Zealand.* NBER working paper. National Bureau of Economic Research.

Leeper Eric M., Walker Todd B., and Yang Shu-Chun Susan. 2013. "Fiscal Foresight and Information Flows." *Econometrica* 81 (3): 1115–1145.

Leeper, Eric M. 2009. *Anchoring Fiscal Expectations.* SSRN Scholarly Paper ID 1459570. Rochester, NY: Social Science Research Network.

———. 2010. *Monetary Science, Fiscal Alchemy.* NBER Working Paper 16510. National Bureau of Economic Research, October.

Lledó, Victor, Sungwook Yoon, Xiangming Fang, Samba Mbaye, and Young Kim. 2017. *Fiscal rules at a glance.* Background note. International Monetary Fund.

MacKinnon, James G. 1994. "Approximate asymptotic distribution functions for unit-root and cointegration tests." *Journal of Business & Economic Statistics* 12 (2): 167–76.

Magnus, Jan R, and James Durbin. 1999. "Estimation of regression coefficients of interest when other regression coefficients are of no interest." *Econometrica* 67 (3): 639–43.

Magnus, Jan R, Owen Powell, and Patricia Prüfer. 2010. "A comparison of two model averaging techniques with an application to growth empirics." *Journal of econometrics* 154 (2): 139–53.

Merola, Rossana, and Javier Pérez. 2012. *Fiscal forecast errors: governments vs independent agencies?* Technical report. Banco de España Working Paper.

Mourre, Gilles, Aurélien Poissonnier, and Martin Lausegger. 2019. *The Semi-Elasticities Underlying the Cyclically-Adjusted Budget Balance: An Update and Further Analysis.* Technical report. Directorate General Economic and Financial Affairs, European Commission.

Spearman, Claude. 1904. "The Proof and Measurement of Association between Two Things." *The American Journal of Psychology* 15 (1): 72–101.

Wooldridge, Jeffrey M. 2010. *Econometric analysis of cross section and panel data.* MIT press.

Appendices

A Data coverage

Country	Code	First available		Forecast directly in % of GDP	# of obs.	Group
		Official forecast	Consensus forecast			
Austria	AUT	1998M11	2012M05	Yes*	92	Core
Belgium	BEL	1998M12	2012M05	Yes*	92	Core
Bulgaria	BGR	2007M12	2007M05	Yes	145	Eastern
Croatia	HRV	2013M04	2007M05	Yes	81	Eastern
Cyprus	CYP	2004M05	2014M01	Yes*	72	Program
Czech Republic	CZE	2004M05	1998M05	Yes	188	Eastern
Denmark	DNK	1998M12	2008M02	Yes*	143	Core
Estonia	EST	2004M05	2007M05	Yes	152	Eastern
Finland	FIN	1998M09	2012M08	Yes*	89	Core
France	FRA	1998M12	1995M01	No	253	Core
Germany	DEU	1999M01	1995M01	No	252	Core
Greece	GRC	1998M12	2010M05	Yes*	116	Program
Hungary	HUN	2004M12	1998M05	Yes	181	Eastern
Ireland	IRL	1998M12	2010M05	Yes*	116	Program
Italy	ITA	1998M12	1995M01	No	253	Core
Latvia	LVA	2004M12	2007M05	Yes	152	Eastern
Lithuania	LTU	2004M05	2007M05	Yes	152	Eastern
Luxembourg	LUX	1999M02	2014M08	Yes	65	Core
Netherlands	NLD	1998M11	2010M03	No	118	Core
Poland	POL	2004M12	1998M05	Yes	181	Eastern
Portugal	PRT	2000M02	2010M05	Yes*	116	Program
Romania	ROM	2007M11	2010M05	Yes*	116	Eastern
Slovak Republic	SVK	2004M11	2010M03	Yes	118	Eastern
Slovenia	SVN	2004M05	2007M05	Yes	152	Eastern
Spain	ESP	1998M12	2008M03	No	142	Program
Sweden	SWE	1998M12	2007M10	No	147	Core
United Kingdom†	GBR	1998M12	1995M01	No	253	Core

* Available *via* Bloomberg

† Relies on fiscal years that start in April.

B Data sources and definitions

	Definition	Unit	Sources
$\mathbb{E}_t^p b$	Private forecast of general government's overall balance	percent of GDP	Monthly Consensus Economics publications, Bloomberg surveys
$\mathbb{E}_t^o b$	Official forecast of general government's overall balance	percent of GDP	Stability and Convergence Programs, Draft budgetary plans, and program reviews
og	Output gap	percent of potential GDP	WEO
g	Real GDP growth	percent of GDP	WEO
D	Public debt	percent of GDP	WEO
b	General government's overall balance (net borrowing)	percent of GDP	Eurostat
pb	Non-interest balance	percent of GDP	WEO
i	Long-term yield (10-year Treasury bond)	percent	WEO
	GDP per capita	€ and US$	WEO
	Fiscal rule design	indices	IMF fiscal rule database (Lledó et al. 2017)
	Fiscal councils	indices	IMF Fiscal council dataset (Debrun et al. 2013; Beetsma et al. 2019)
	Independent fiscal institution	index	European Commission, 2018 vintage
	Sovereign CDS spreads and currency asset swap spreads	last price	Bloomberg
	Sovereign credit ratings	index	DBRS Morningstar, Moody's, Fitch, S&P
	Sovereign yields	percent	Eurostat (Maastricht definition), Bloomberg
	Headline and core inflation	percent, year-over-year	Eurostat (HCPI)
	IMF programs and program reviews	Dummy	IMF's Monitoring of Fund Arrangements (MONA) database
	Political data	index	Comparative Political dataset (CPDS) (Armingeon, Wenger, Wiedemeier, Isler, Knöpfel, Weisstanner, and Engler 2019; Armingeon, Wenger, Wiedemeier, Isler, Knöpfel, and Weisstanner 2019), which I completed over 2018–19
	Trust in politicians	percent	European Social Survey (ESS)
	Election	dummy	Election Guide by International Foundation for Electoral Systems (IFES) [here]
	Export quality/diversification	indices[†]	IMF (based on Cadot, Carrère, and Strauss-Kahn 2011; Henn, Papageorgiou, and Spatafora 2013)

[†] Export diversification is a Theil index: a lower value corresponds to more diversified exports.

C Cyclical adjustment

To verify whether my credibility indicator is mostly driven by difference in views about growth and price developments, I would need to compare private and official forecasts of cyclically-adjusted balances rather than those of overall balances. Yet, this is not feasible, as private forecasters publish neither cyclically-adjusted balance forecasts, nor the output gap estimates that underlie their calculation. Even governments started only lately to publish such forecasts on a systematic basis. However, as a robustness check, I proceed as follows.

Cyclically-adjusted balances are fiscal balances from which the effects of the cycle are filtered out. Since the latter are difficult to estimate with precision, analysts usually rely on estimates of the elasticity to output of the various revenue and spending items that compose the fiscal balance. Namely, if $b_t = \sum_k r_{kt} - \sum_k g_{kt}$ is a breakdown of the fiscal balance (as a ratio of GDP) and Y and Y^* stand for the actual and potential GDP, then the cyclically-adjusted balance as a share of potential GDP can be computed as (Bornhorst et al. 2011):

$$b_t^* \equiv \sum_k r_{kt} \left(\frac{Y_t^*}{Y_t}\right)^{\varepsilon_k - 1} - \sum_k g_{kt} \left(\frac{Y_t^*}{Y_t}\right)^{-\eta_k - 1}$$

The elasticity coefficients $(\varepsilon_k)_k$ and $(\eta_k)_k$ are all non-negative; they are close to 1 for tax revenues, and close to nil for spending (except for automatic stabilizers, such as unemployment benefits).[34] Hence the following first order of approximation when the output gap $og_t = Y_t/Y_t^* - 1$ is small:

$$b_t^* \approx b_t + og_t \left[\sum_k r_{kt}(1-\varepsilon_k) - \sum_k g_{kt}(1+\eta_k)\right] \approx b_t - og_t \sum_k g_{kt}$$

It is thus commonly assumed that the cyclical component of the fiscal balance is εog_t, with the overall elasticity ε roughly constant and equal to the government's size (*i.e.*, in most advanced economy cases, between 0.3 and 0.5). Assuming that the government and private forecasters agree on the way to compute cyclically-adjusted balances and on its parameters (ε), I can define a cyclically-adjusted indicator of credibility as:

$$Cred_{i,t}^{*(h)} \equiv Cred_{i,t}^{(h)} - \varepsilon_i \left[\mathbb{E}_t^p og_{i,t+h} - \mathbb{E}_t^o og_{i,t+h}\right] \tag{C.1}$$

The problem here is that the bracket is unknown, unless another—less benign—assumption is made: that official and private forecasts share the same estimates of potential growth and $t-1$ output gap, in which case the bracket becomes a simple function of their respective growth forecasts:[35]

$$Cred_{i,t}^{*(h)} \approx Cred_{i,t}^{(h)} - \varepsilon_i \sum_{\ell=0}^{h} \mathbb{E}_t^p g_{i,t+\ell} - \mathbb{E}_t^o g_{i,t+\ell} \tag{C.2}$$

34. The two "-1" in the exponents appear when one looks at (potential) GDP ratios. The elasticities themselves are defined as $\ln R_k = \alpha_k + \varepsilon_k \ln Y$ and $\ln R_k = \beta_k - \eta_k \ln Y$.

35. Indeed, in first approximation, $\Delta og_t = g_t - g_t^*$ with g and g^* denoting respectively the rates of actual and potential growth.

Data sources are similar to what I present in section 2. Governments' growth forecasts are taken from SCPs, DBPs, and program documents; private forecasts come from data published by Bloomberg and Consensus Economics. Last, I use country-specific elasticities ε_i as estimated by Mourre, Poissonnier, and Lausegger (2019) and used by the European Commission.

D Indicators of past fiscal performance

A nice feature of my dataset is that I can compute revisions in fiscal plans, as well as real time forecast errors, as they could have been observed by contemporaneous forecasters. The forecast error the government makes at time t about its year $t+h$ deficit is simply the slippage between official plans and actual outcomes:

$$e_t^{(h)} \equiv \mathbb{E}_t^o b_{i,t+h} - b_{i,t+h} \; \forall h \in, \tag{D.1}$$

The latter forecast error is somewhat of an anachronism, in the sense that it is measured from today's perspective——after several rounds of national accounts revisions and sometimes changes in the basis year or accounting rules. As an alternative, I can look at the error as observed from the first outturn estimate, which is probably the slippage private forecasters eventually remember:[36]

$$\hat{e}_{i,t}^{(h)} \equiv \mathbb{E}_t^o b_{i,t+h} - \mathbb{E}_{\tilde{t}+h+1}^o b_{i,t+h} \tag{D.2}$$

Another possible source of concern for private agents is the government' changing markedly their fiscal targets—let us just imagine what would happen to inflation forecasts if central banks changed their objectives every six months. I compute target revisions as the latest change in official forecasts:

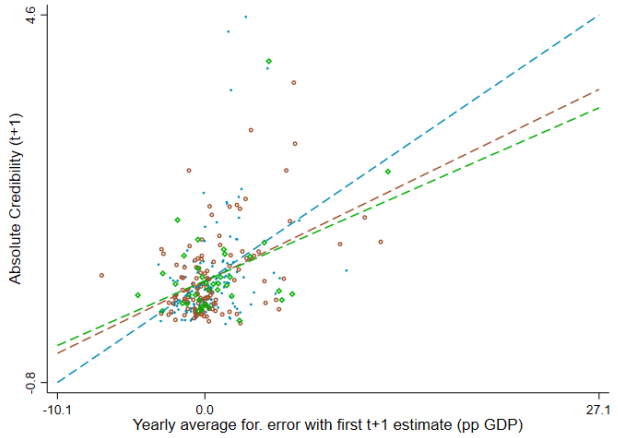
$$\delta_t^{(h)} = \begin{cases} \mathbb{E}_t^o b_{i,t+h} - \mathbb{E}_{t-1}^o b_{i,t+h} & \text{if there is a new release in } t \\ \delta_{t-1}^{(h)} & \text{otherwise} \end{cases} \tag{D.3}$$

Since markets likely keep track of the history of fiscal revisions and slippages, I examine in this paper two rolling averages of forecast errors and revisions: namely, if $x \in \{e, \hat{e}, \delta\}$, a moving average over the 24 months $x_{i,t|24m}^{(h)} \equiv \left\langle x_{i,s}^{(h)} \right\rangle_{t-24 \leq s \leq t-1}$; and an average of the last two full calendar years $x_{i,t|2yr}^{(h)} \equiv \left\langle x_{i,s}^{(h)} \right\rangle_{\lfloor t/12 \rfloor - 24 \leq s \leq \lfloor t/12 \rfloor - 1}$. Some results are plotted on Figure D.1. The main findings are that credibility seems to erode when observed forecasts errors increase, or when the government has revised often its fiscal balance downwards (*i.e.*, to a larger deficit).

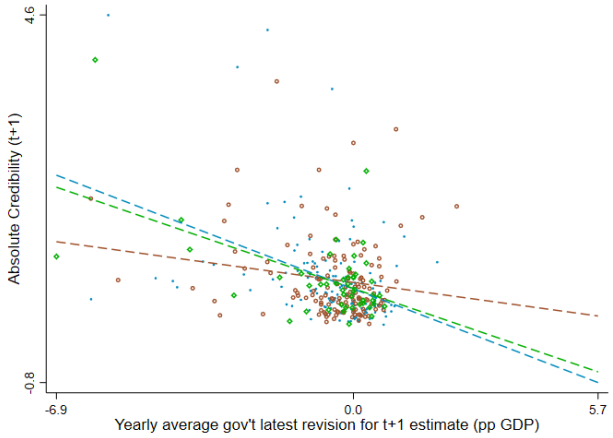
36. $\tilde{t}$ is the first month of year $t+h+1$ in which governments release an outturn estimate for year $t+h$ (usually between March and June).

Figure D.1: *Credibility and past fiscal performance*

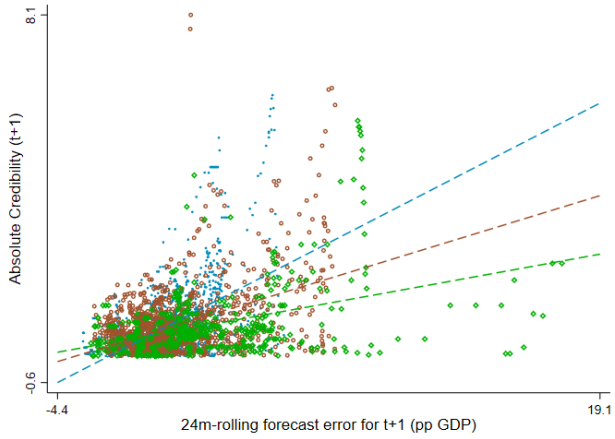
(a) Impact of past errors (as observed at first)



(b) Revisions for year $t+1$



(c) Rolling average of forecast errors

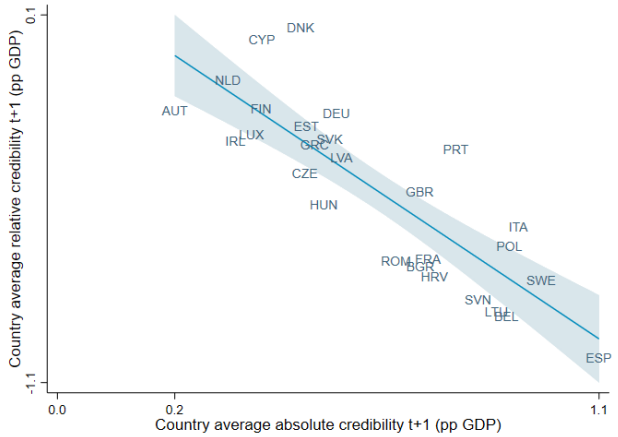


Notes: Blue dots are for "core" economies, red circles for IMF programs, and green diamonds for Eastern European countries—these country groups are defined in appendix A. Dashed lines are linear regressions (per country type).

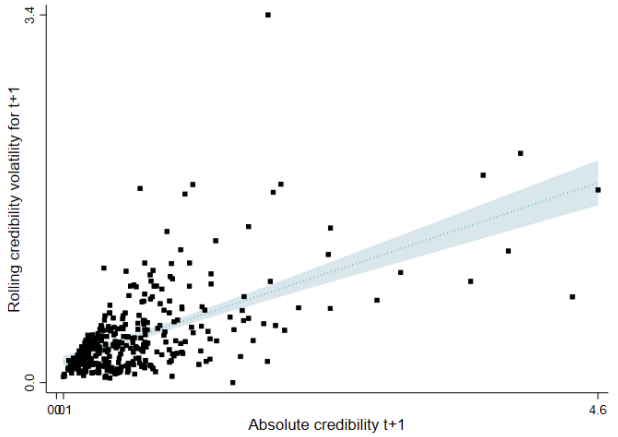
E Correlations between credibility indicators

Figure E.1: *Correlations between absolute credibility and other indicators (for $h = 1$)*

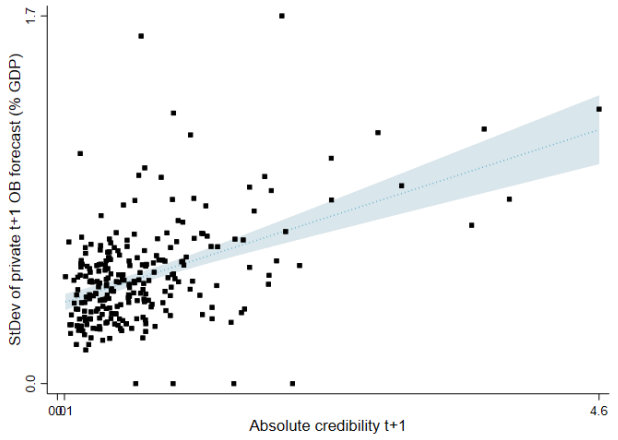
(a) Relative versus absolute credibility (country averages)



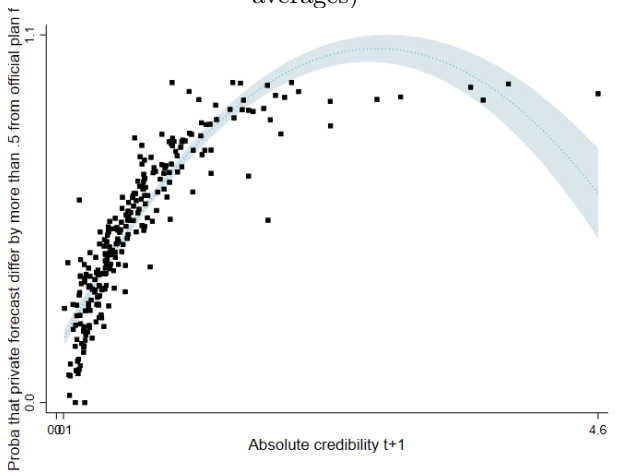
(b) Volatility versus absolute credibility (country-year averages)



(c) Relative versus absolute credibility (country-year averages)



(d) Probability of divergent expectation (country-year averages)



Note: Dotted lines represent a plain linear regression and shaded areas the associated 95-percent confidence bands.

Table E.1: *Pearson's correlation and Spearman's rank correlation (in percent)*

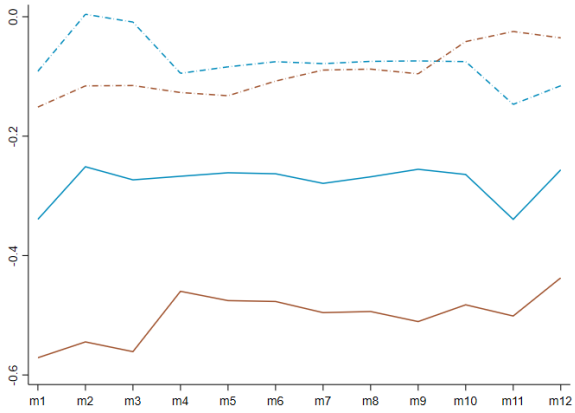
		$Cred$		$ACred$		$ACred^*$		$SdCred$		Vol		$\tau_{1/2}$		P	
		(t)	(t+1)	(t)	(t+1)	(t)	(t+1)	(t)	(t+1)	(t)	(t+1)	(t)	(t+1)	(t)	(t+1)
$Cred$	(t)		73‡	-64‡	-45†	-56‡	-35*	-38	-40	-51‡	-18	-15	-2	-47†	-44*
	(t+1)	73‡		-51‡	-84‡	-18	-47†	-25	-28	-15	-40†	-19	11	-60‡	-80‡
$ACred$	(t)	-48†	-50‡		59‡	82‡	48†	33	24	59‡	62‡	51‡	28	67‡	46*
	(t+1)	-44†	-86‡	52‡		24	61‡	-2	3	9	70‡	31	10	54†	80‡
$ACred^*$	(t)	-42†	-18	78‡	20		53‡	32	21	71‡	29	18	14	54†	29
	(t+1)	-32	-44†	34*	54‡	50‡		30	32	19	37*	4	-17	56†	46*
$SdCred$	(t)	-42*	-31	34	-3	33	28		91‡	32	-17	-10	-41*	66‡	16
	(t+1)	-45*	-41*	31	8	25	34	93‡		24	-9	-16	-45*	59‡	19
Vol	(t)	-54‡	-39†	82‡	33	72‡	25	40*	42*		29	15	8	45*	15
	(t+1)	-11	-44†	63‡	70‡	30	31	-16	-5	58‡		54‡	35*	17	17
$\tau_{1/2}$	(t)	-11	-19	49†	30	12	-4	-5	-5	38*	61‡		64‡	19	-6
	(t+1)	-7	5	26	10	14	-19	-36	-41*	21	41†	69‡		-18	-16
P	(t)	-40*	-51†	53†	47†	52†	60‡	66‡	67‡	39	11	5	-26		70‡
	(t+1)	-43*	-72‡	38	78‡	28	47†	16	22	14	13	-17	-17	69‡	

Notes: The upper right half of the matrix reports pairwise correlations between the various credibility indicators (average country indicators, while the lower right side shows their Spearman's rank correlations—that is, the correlation between country rankings according these various statistics. ‡, †, and * stand for rejection of the hypothesis that there is no linear/monotonic relationship at the 1, 5, and 10 percent confidence levels.

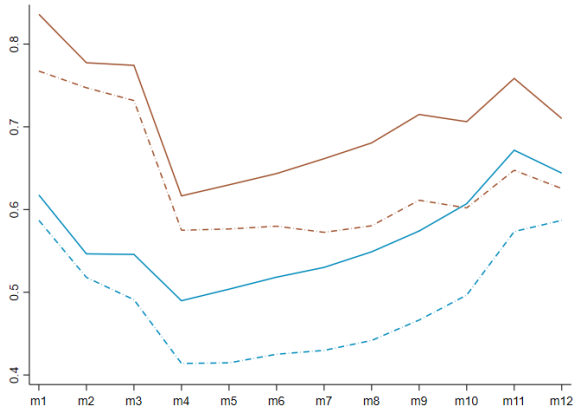
F Event studies

Figure F.1: *Seasonal patterns (averages per month, in percent of* GDP*)*

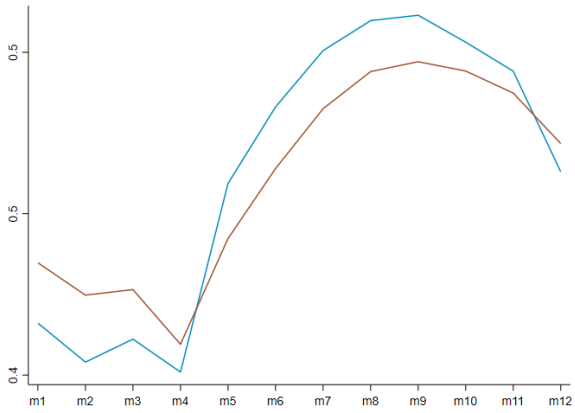
(a) Relative credibility



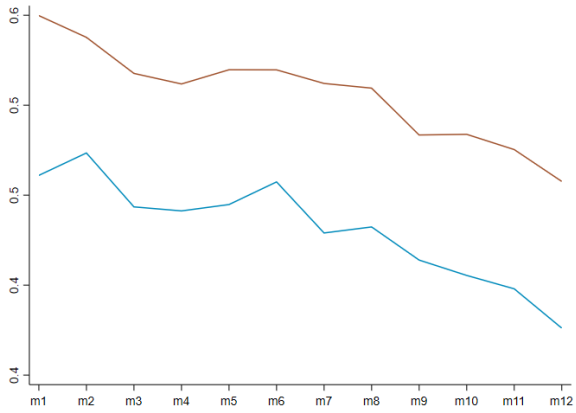
(b) Absolute credibility



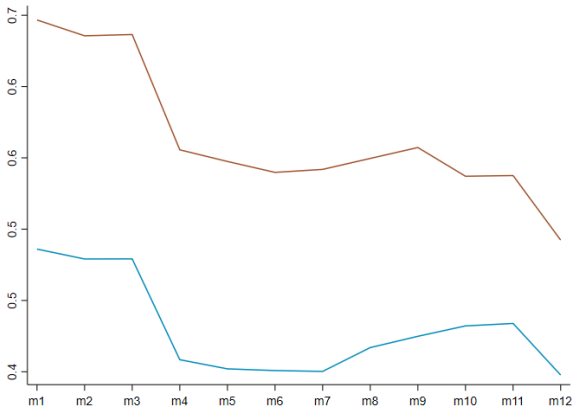
(c) Volatility



(d) Dispersion of forecasters

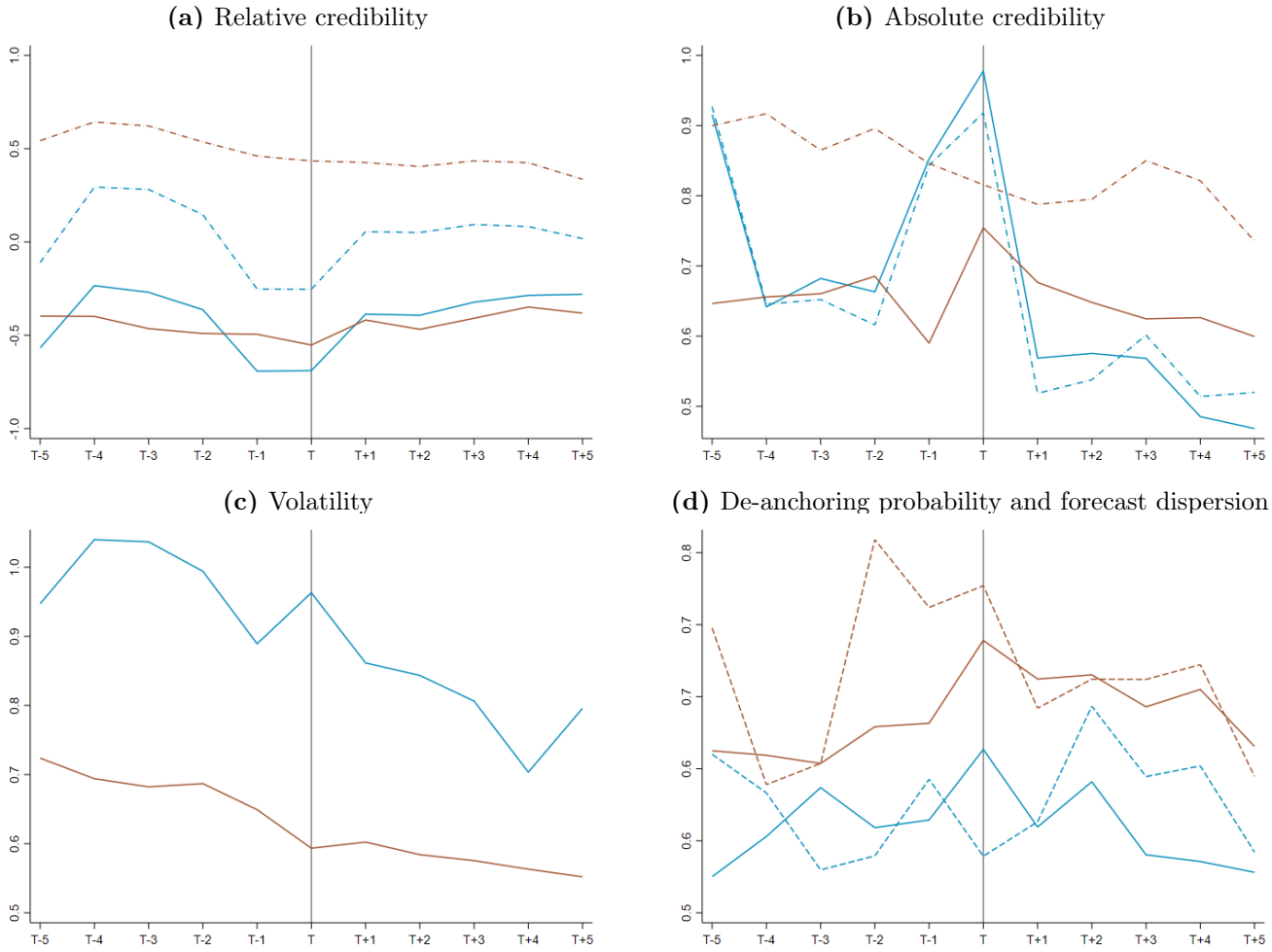


(e) Probability of de-anchoring



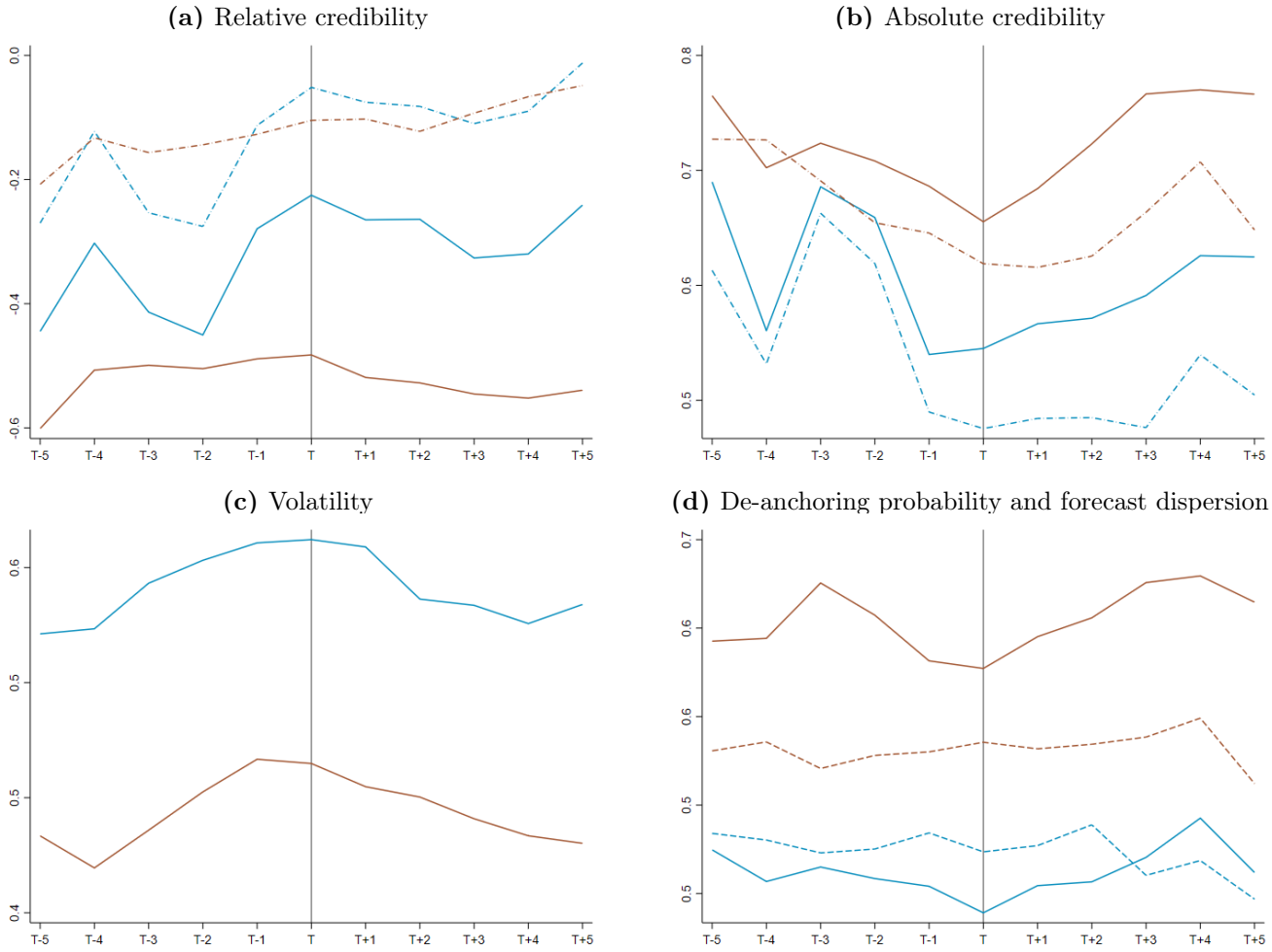
Note: Blue and orange lines are respectively for $h = 0$ and $h = 1$; dashed lines include cyclical adjustment. The U.K., whose fiscal year starts in April, is excluded.

Figure F.2: *Evolution around* IMF *program reviews*



Notes: The horizontal axis is in months; T is the date when the review is officially approved by the IMF Board. Blue and orange lines are respectively for $h = 0$ and $h = 1$. Dashed lines represent cyclically-adjusted credibility on panels (a)-(b), and private forecast dispersion on panel (d).

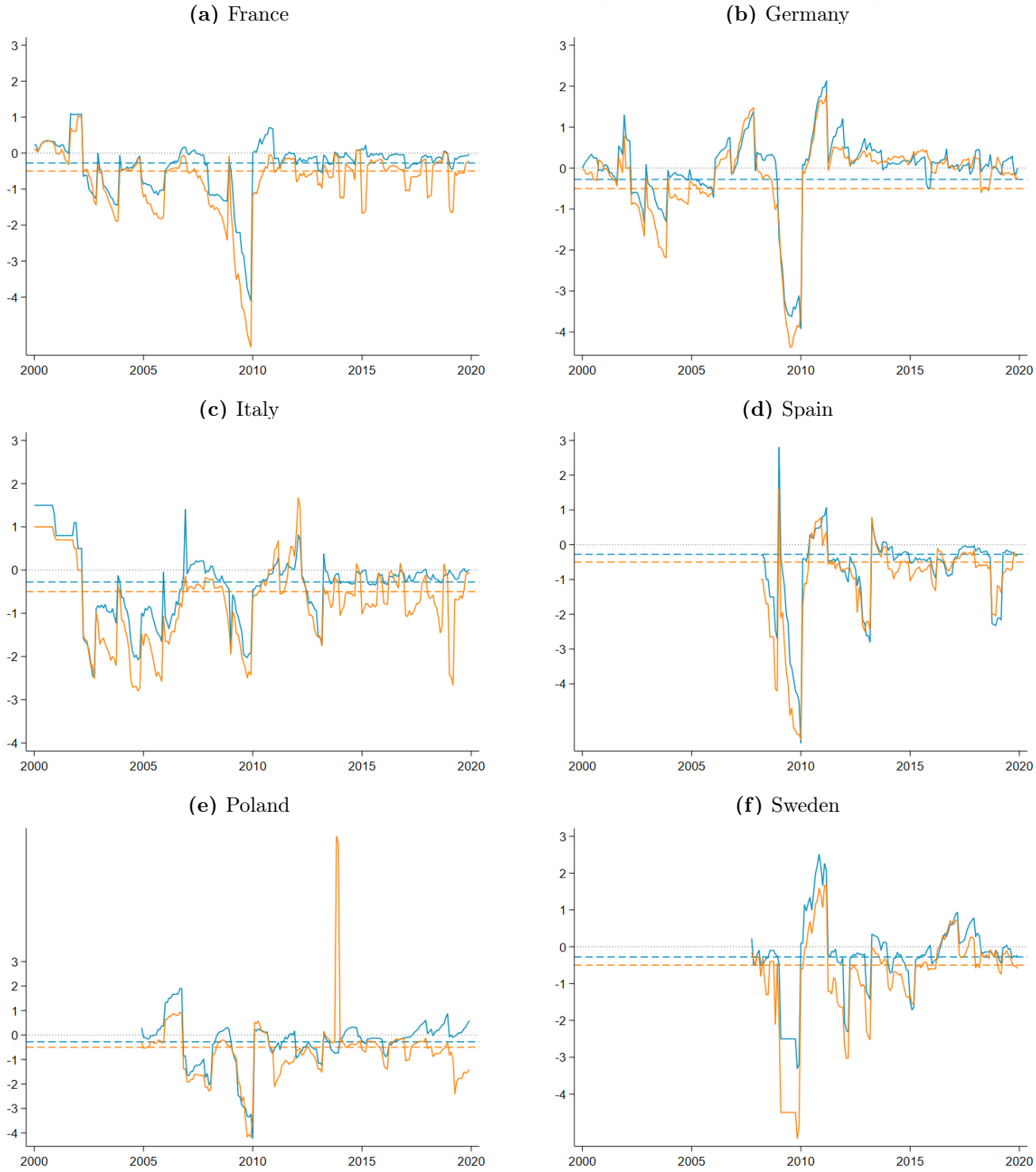
Figure F.3: *Evolution around elections*



Notes: The horizontal axis is in months; T is the time of a general election for the central government (presidential or parliamentary). Blue and orange lines are respectively for $h = 0$ and $h = 1$. Dashed lines represent cyclically-adjusted credibility on panels (a)-(b), and private forecast dispersion on panel (d).

G Credibility over time

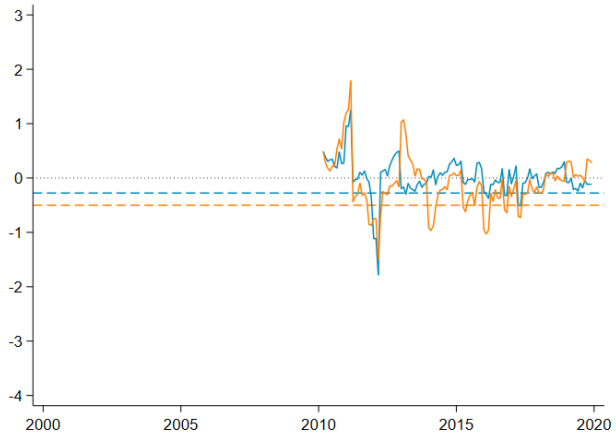
Figure G.1: *Relative Credibility over Time (in percentage point of* GDP*)*



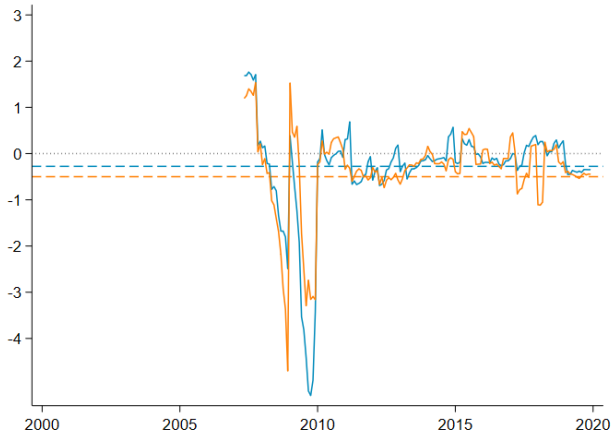
Note: Dotted lines are the sample averages. Blue for $h = 0$; orange for $h = 1$.

Figure G.1: *Relative Credibility over Time (continued)*

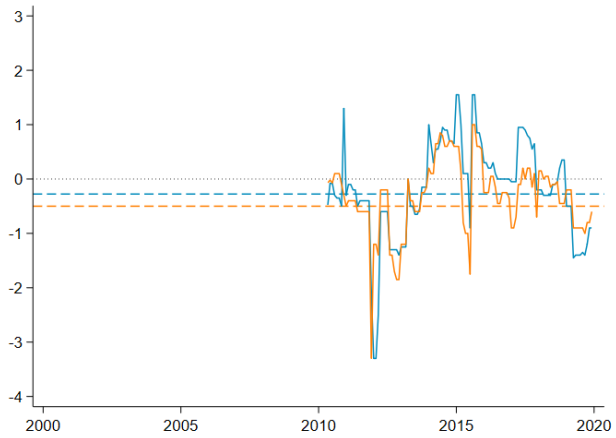
(g) Netherlands



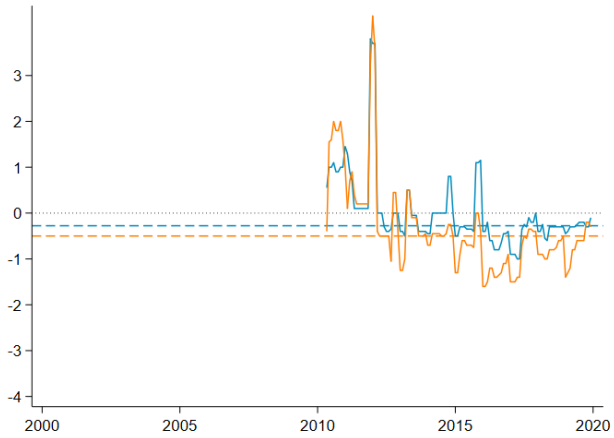
(h) Latvia



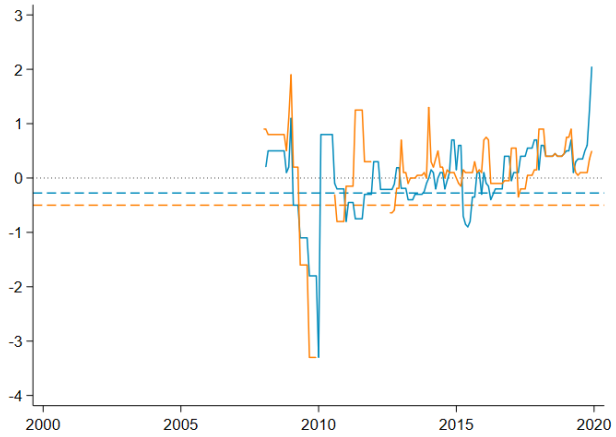
(i) Greece



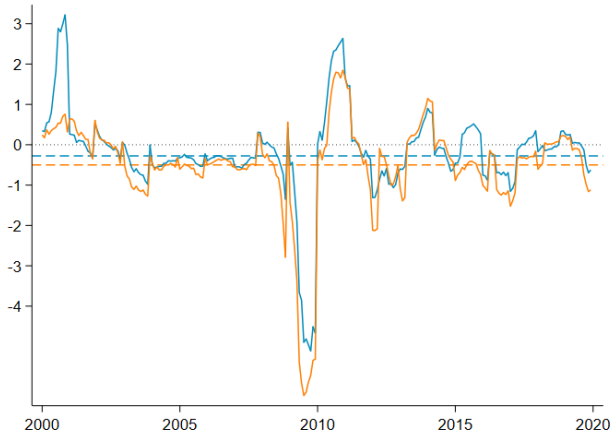
(j) Portugal



(k) Denmark

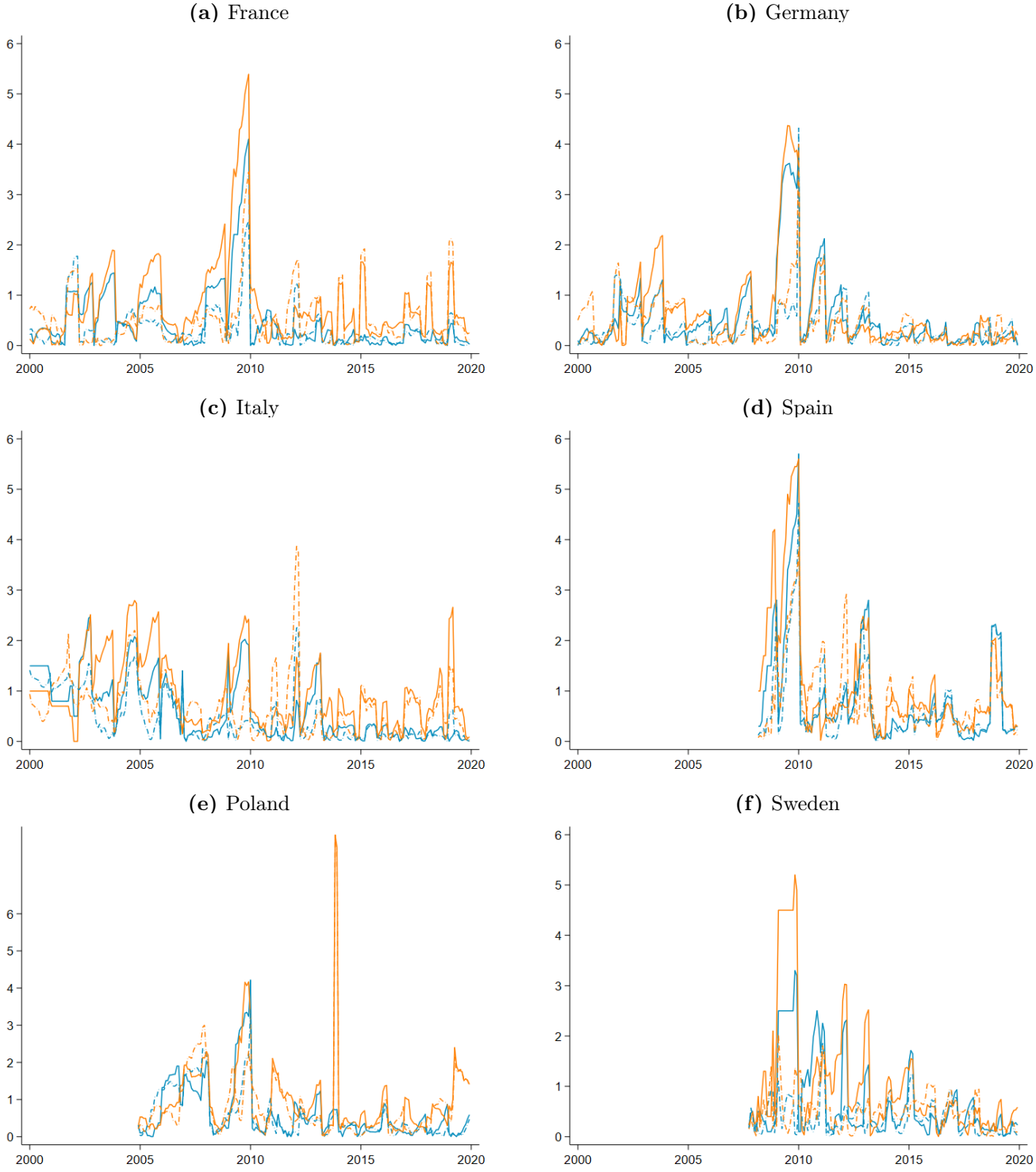


(l) U.K.



Note: Dotted lines are the sample averages. Blue for $h = 0$; orange for $h = 1$.

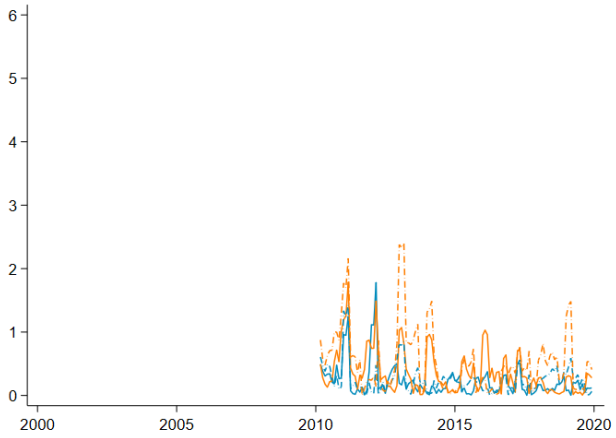
Figure G.2: *Absolute credibility over time (in percentage point of* GDP*)*



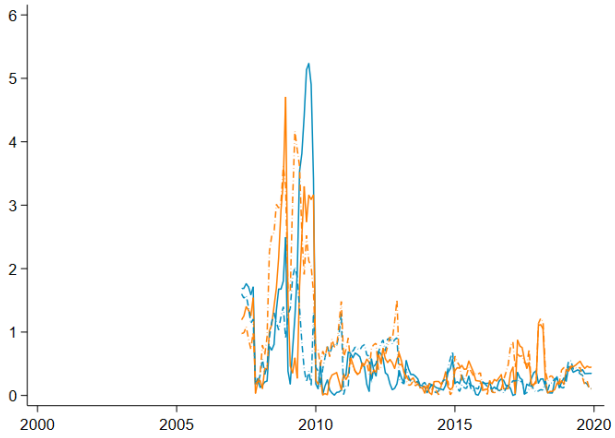
Note: Dotted lines are the cyclically adjusted series. Blue for $h = t$; orange for $h = t + 1$.

Figure G.2: *Absolute Credibility over Time (continued)*

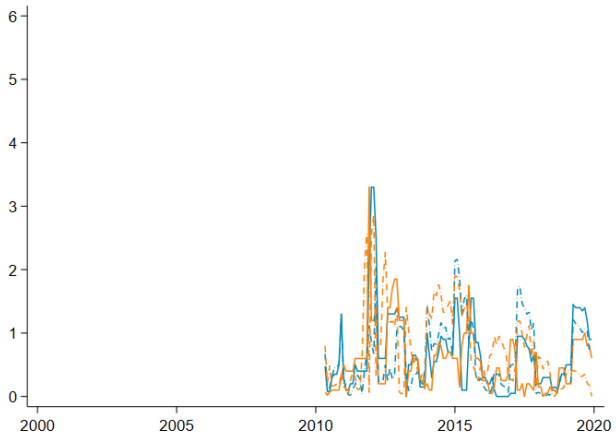
(g) Netherlands



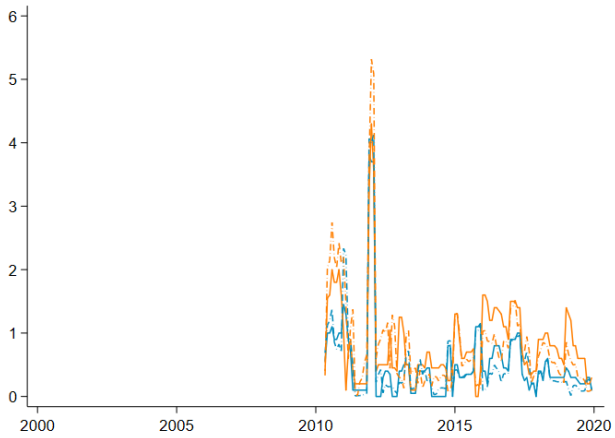
(h) Latvia



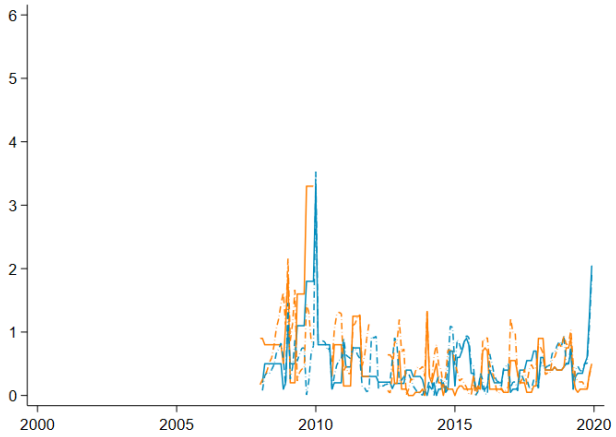
(i) Greece



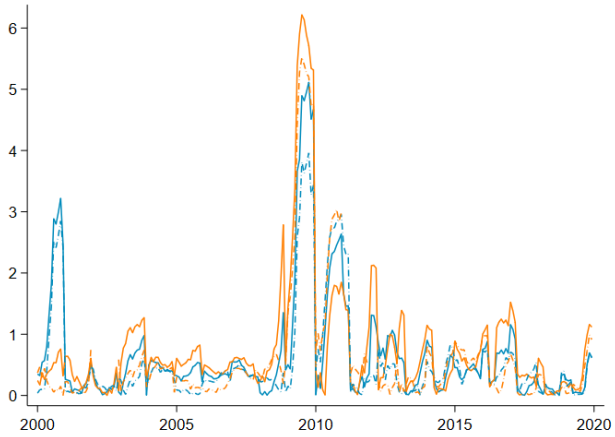
(j) Portugal



(k) Denmark



(l) U.K.



Note: Dotted lines are the cyclically-adjusted series. Blue for $h = t$; orange for $h = t + 1$.

H Further empirical analysis

Table H.1: *Results of Augmented Dickey-Fuller tests and half-life times*

	Horizon $h = t$			Horizon $h = t + 1$		
	Lag coeff	Z stat	p-val*	Lag coeff	Z stat	p-val*
Austria	-0.489	-3.846	0.002	-0.379	-3.398	0.011
Belgium	-0.440	-3.656	0.005	-0.488	-3.738	0.004
Bulgaria	-0.099	-2.835	0.053	-0.120	-2.781	0.061
Croatia	-0.280	-3.249	0.017	-0.200	-1.925	0.320
Cyprus	-0.120	-3.668	0.005	-0.118	-3.434	0.010
Czech Rep.	-0.111	-3.750	0.003	-0.085	-3.558	0.007
Denmark	-0.233	-3.161	0.022	-0.078	-1.129	0.703
Estonia	-0.263	-3.766	0.003	-0.161	-2.945	0.040
Finland	-0.125	-2.922	0.043	-0.099	-2.648	0.083
France	-0.428	-3.575	0.006	-0.431	-3.511	0.008
Germany	-0.136	-4.015	0.001	-0.106	-3.235	0.018
Greece	-0.129	-4.657	0.000	-0.113	-3.843	0.002
Hungary	-0.177	-2.793	0.059	-0.315	-3.874	0.002
Ireland	-0.149	-2.379	0.148	-0.141	-2.503	0.115
Italy	-0.144	-3.707	0.004	-0.115	-3.249	0.017
Latvia	-0.631	-5.294	0.000	-0.254	-2.313	0.168
Lithuania	-0.090	-3.488	0.008	-0.090	-3.297	0.015
Luxembourg	-0.176	-3.699	0.004	-0.149	-3.363	0.012
Netherlands	-0.442	-3.321	0.014	-0.153	-2.026	0.275
Poland	-0.171	-4.250	0.001	-0.344	-4.959	0.000
Portugal	-0.407	-4.207	0.001	-0.239	-3.152	0.023
Romania	-0.164	-3.910	0.002	-0.313	-4.799	0.000
Slovak Rep.	-0.258	-3.343	0.013	-0.169	-2.874	0.048
Slovenia	-0.254	-3.271	0.016	-0.225	-3.333	0.013
Spain	-0.201	-3.195	0.020	-0.080	-2.076	0.254
Sweden	-0.268	-3.994	0.001	-0.183	-3.108	0.026
U.K.	-0.144	-3.052	0.030	-0.129	-2.885	0.047

* MacKinnon (1994)'s approximation

Table H.2: *Asymmetric persistence test*

	Horizon $h = t$		Horizon $h = t + 1$	
	Lag coeff	Lag < 0	Lag coeff	Lag < 0
Austria	-0.939***	0.657***	-0.624**	0.459*
Belgium	-0.577*	0.447	-0.132	0.069
Bulgaria	-0.711***	0.641***	-0.520	0.455
Croatia	-0.284***	0.010	-0.178	-0.070
Cyprus	-0.256**	0.158	-0.520**	0.430**
Czech Rep.	-0.149***	0.051	-0.147**	0.076
Denmark	-0.135	-0.134	-0.251***	0.290***
Estonia	-0.808***	0.639**	-1.112***	1.011**
Finland	-0.354***	0.276**	-0.265**	0.198*
France	-0.345**	-0.200	-0.347	0.021
Germany	-0.219**	0.117	-0.250	0.190
Greece	-0.120***	-0.008	-0.137	0.046
Hungary	-0.246**	0.106	-0.170	-0.070
Ireland	-0.190	0.085	-0.533	0.491
Italy	-0.922***	0.807***	-1.326***	1.249***
Latvia	-1.429	0.827	0.125	-0.260
Lithuania	-0.076*	-0.014	-0.091	0.033
Luxembourg	-0.476	0.337	-0.927	0.846
Netherlands	-0.619**	0.383	-0.421	0.353
Poland	-0.450***	0.323**	-0.310	-0.038
Portugal	-0.389***	-0.036	-0.267	0.058
Romania	-0.189**	0.049	-0.617***	0.504***
Slovak Rep.	-0.295***	0.139	-0.215**	0.116
Slovenia	-0.806**	0.696*	4.036	-4.260
Spain	-0.573***	0.468***	0.006	-0.163
Sweden	-0.443***	0.276**	-0.379	0.202
U.K.	-0.107	-0.042	-0.175	0.053

Table H.3: *Granger causality tests*

	CDS causes Cred				Yield causes Cred				Cred causes CDS				Cred causes Yield			
	F		χ^2		F		χ^2		F		χ^2		F		χ^2	
AUT	0.852		6.022		2.460	†	17.391	‡	2.273	†	16.064	†	0.896		6.332	
BEL	0.072		0.512		0.410		2.897		1.506		10.644		1.917	*	13.551	†
BGR	2.097	*	13.883	†					2.577	†	17.059	‡				
CYP	0.855		6.388		1.460		12.317	*	0.556		4.153		0.140		1.182	
CZE	1.650		11.070	*	1.660		10.921	*	5.809	‡	38.976	‡	1.461		9.610	
DEU	0.556		3.604		1.478		9.417		4.631	‡	30.027	‡	1.337		8.520	
DNK	1.150		7.997		0.902		6.125		1.915	*	13.309	†	1.183		8.032	
ESP	0.796		5.279		0.330		2.187		0.835		5.538		0.381		2.526	
EST	12.628	‡	83.173	‡					5.084	‡	33.487	‡				
FIN	0.059		0.423		1.224		8.705		1.022		7.274		2.053	*	14.608	†
FRA	0.372		2.420		0.601		3.828		0.685		4.457		0.521		3.322	
GBR	4.746	‡	31.008	‡	1.620		10.324		0.363		2.373		0.968		6.166	
GRC	1.820		12.381	*	3.850	‡	26.194	‡	11.666	‡	79.378	‡	4.170	‡	28.373	‡
HRV	4.988	‡	36.205	‡					1.168		8.478					
HUN	1.160		7.521		3.015	‡	19.834	‡	0.088		0.569		0.571		3.758	
IRL																
ITA	0.289		1.859		1.639		10.445		0.914		5.877		0.440		2.803	
LTU	0.265		1.786		2.597	†	18.521	‡	3.473	‡	23.415	‡	0.337		2.403	
LVA	4.756	‡	31.328	‡	2.166	*	16.447	†	7.746	‡	51.019	‡	1.141		8.666	
NLD	1.906	*	12.941	†	2.165	*	14.695	†	1.565		10.623		1.254		8.511	
POL	0.737		4.777		2.772	†	17.967	‡	0.283		1.832		0.307		1.991	
PRT	0.958		6.520		0.849		5.777		2.414	†	16.425	†	3.776	‡	25.694	‡
ROM	0.668		4.546						0.379		2.577					
SVK	1.063		7.219		0.959		6.508		4.136	‡	28.077	‡	1.472		9.989	
SVN	1.967	*	12.958	†	3.109	‡	21.443	‡	2.176	†	14.335	†	2.920	†	20.135	‡
SWE	4.272	‡	28.236	‡	2.047	*	13.526	†	1.612		10.655	*	0.950		6.282	

Notes: Up to 3 lags are included. The null hypothesis H_0 is that there is no causal relationship; ‡, †, and * stand for the rejection of H_0 at the 1, 5, and 10 percent confidence levels.

Table H.4: *Determinants of short-term credibility ($h = 0$)*

	Base	InitialConditions							Institutions				Policy					Political	Combined
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Credibility in t-1	0.740***	0.740***	0.739***	0.739***	0.736***	0.740***	0.763***	0.739***	0.738***	0.738***	0.737***	0.738***	0.738***	0.720***	0.732***	0.734***	0.648***	0.738***	0.783***
	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.011]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.011]	[0.011]	[0.011]	[0.013]	[0.010]	[0.010]
Release of new target for t+1 (dummy)	-0.255***	-0.272***	-0.270***	-0.271***	-0.272***	-0.274***	-0.224***	-0.272***	-0.269***	-0.255***	-0.253***	-0.255***	-0.254***	-0.260***	-0.265***	-0.284***	-0.270***	-0.255***	-0.316***
	[0.021]	[0.021]	[0.021]	[0.021]	[0.021]	[0.021]	[0.023]	[0.021]	[0.021]	[0.021]	[0.021]	[0.021]	[0.021]	[0.022]	[0.022]	[0.023]	[0.025]	[0.021]	[0.023]
= 1 when election occurs	0.002	-0.006	-0.008	-0.005	-0.007	-0.005	-0.008	-0.004	-0.007	0.002	0.002	0.002	0.001	0.003	0.008	0.001	0.002	0.001	-0.011
	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.028]	[0.029]	[0.032]	[0.034]	[0.027]	[0.030]
(mean) IMFprog_review	0.178***	0.175***	0.176***	0.172***	0.155***	0.178***	0.180**	0.171***	0.168***	0.181***	0.171***	0.176***	0.166***	0.193***	0.167***	0.167***	0.151***	0.179***	0.108**
	[0.048]	[0.048]	[0.048]	[0.049]	[0.049]	[0.048]	[0.082]	[0.049]	[0.049]	[0.048]	[0.049]	[0.048]	[0.049]	[0.053]	[0.049]	[0.052]	[0.052]	[0.049]	[0.053]
Public debt ratio in t-1 (in % GDP)		0.000*																	
		[0.000]																	
Primary balance in t-1 (% GDP, WEO)			-0.007*																0.003
			[0.004]																[0.004]
Inflation in t (average yoy, %)				0.009**															
				[0.005]															
Output gap in t-1 (in %)					-0.011***														-0.011***
					[0.003]														[0.003]
Real GDP growth in t-1 (in %)						-0.008***													
						[0.003]													
Sovereign yield (10 yr, Bloomberg)							0.011***												
							[0.003]												
Real policy rate								-0.011**											
								[0.005]											
Log GDP per capita									-0.022**										
									[0.010]										
Expenditure rule at the national level (1), supranational level (2), or both (3)										-0.021*									
										[0.011]									
Revenue rule at the national level (1), supranational level (2), or both (3)											-0.047***								
											[0.017]								
fr_legal_any												-0.022*							
												[0.013]							
Adjustment planned in t+1 (pp GDP)													0.012***						
													[0.005]						
24m-rolling gov't latest revision for t+1 estimate (pp GDP)														-0.024**					
														[0.010]					
Yearly average forecast error for t+1 (pp GDP)															0.021***				0.022***
															[0.004]				[0.005]
Yearly average for. error with first t+1 estimate (pp GDP)																0.021***			
																[0.005]			
2yr-rolling for. error with first t+1 estimate (pp GDP)																	0.017**		
																	[0.007]		
Share of gov't from Left party																		-0.000**	
																		[0.000]	
ECB i-rate, main refinancing operation																			-0.029
																			[0.029]
Resid share of public debt (percent)																			0.001
																			[0.000]
Number of numerical fiscal rules																			-0.003
																			[0.006]
Gov't medium term adjustment plan (pp GDP/year)																			-0.028*
																			[0.016]
Constant	0.160***	0.145***	0.166***	0.146***	0.170***	0.181***	0.160***	0.145***	0.390***	0.213***	0.166***	0.253***	0.154***	0.171***	0.147***	0.175***	0.179***	0.169***	0.162***
	[0.025]	[0.028]	[0.026]	[0.027]	[0.026]	[0.027]	[0.024]	[0.027]	[0.110]	[0.038]	[0.025]	[0.060]	[0.025]	[0.025]	[0.026]	[0.028]	[0.046]	[0.025]	[0.054]
Observations	3,910	3,846	3,846	3,846	3,846	3,846	2,876	3,846	3,846	3,910	3,910	3,910	3,910	3,564	3,586	3,238	2,953	3,910	3,070
Number of ccode	27	26	26	26	26	26	21	26	26	27	27	27	27	27	27	27	27	27	23
Fixed effects	YM	YM	YM	YM	YM	YM	YM	YM	YM	YM	YM	YM	YM	YM	YM	YM	CYM	YM	YM
Heterosked	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Autocorr	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	0.997	0.979	0.949	0.998	1.000	0.993	0.977	0.997	0.999	0.996	1.000	1.000	0.997	1.000	1.000	1.000	0.000	0.985	1.000
Wald Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Modif. Wald	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Breusch-Pagan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-1.000	0.000	0.000
Serial	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Same conventions as Table 1.

Table H.5: *Determinants of credibility with lags*

	Base	InitialConditions								Economic	Institutions		Policy						Political			Combined
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Credibility in t-1	0.818***	0.817***	0.816***	0.816***	0.817***	0.817***	0.818***	0.807***	0.826***	0.804***	0.801***	0.805***	0.815***	0.817***	0.812***	0.808***	0.813***	0.817***	0.825***	0.816***	0.816***	0.814***
	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.019]	[0.021]	[0.020]	[0.015]	[0.015]	[0.016]	[0.016]	[0.017]	[0.018]	[0.016]	[0.015]	[0.015]	[0.017]
Credibility in t-2	-0.059***	-0.061***	-0.060***	-0.058***	-0.058***	-0.059***	-0.059***	-0.055***	-0.039***	-0.029	-0.078***	-0.091***	-0.058***	-0.059***	-0.058***	-0.051***	-0.055***	-0.063***	-0.061***	-0.058***	-0.058***	-0.051***
	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.015]	[0.018]	[0.020]	[0.020]	[0.015]	[0.015]	[0.016]	[0.015]	[0.016]	[0.017]	[0.015]	[0.015]	[0.015]	[0.016]
Release of new target for t+1 (dummy)	-0.373***	-0.382***	-0.382***	-0.384***	-0.384***	-0.382***	-0.383***	-0.371***	-0.389***	-0.616***	-0.522***	-0.452***	-0.372***	-0.372***	-0.374***	-0.397***	-0.418***	-0.415***	-0.413***	-0.373***	-0.373***	-0.422***
	[0.022]	[0.022]	[0.022]	[0.022]	[0.022]	[0.022]	[0.022]	[0.022]	[0.022]	[0.029]	[0.033]	[0.030]	[0.021]	[0.022]	[0.024]	[0.022]	[0.024]	[0.026]	[0.023]	[0.022]	[0.022]	[0.024]
= 1 when election occurs	-0.015	-0.019	-0.019	-0.015	-0.017	-0.017	-0.018	-0.015	-0.017	-0.026	-0.054	-0.041	-0.016	-0.015	-0.015	-0.019	-0.018	-0.029	-0.014	-0.014	-0.015	-0.026
	[0.026]	[0.026]	[0.026]	[0.026]	[0.026]	[0.026]	[0.026]	[0.026]	[0.027]	[0.038]	[0.047]	[0.045]	[0.026]	[0.026]	[0.028]	[0.028]	[0.030]	[0.032]	[0.028]	[0.026]	[0.026]	[0.030]
(mean) IMFprog_review	0.101**	0.090**	0.100**	0.094**	0.097**	0.090**	0.097**	0.096**	0.106**	0.129**	0.004	0.028	0.087*	0.088**	0.125***	0.116**	0.120**	0.087*	0.223***	0.101**	0.103**	0.086*
	[0.044]	[0.045]	[0.044]	[0.044]	[0.045]	[0.045]	[0.045]	[0.044]	[0.043]	[0.060]	[0.070]	[0.053]	[0.045]	[0.045]	[0.047]	[0.046]	[0.049]	[0.045]	[0.060]	[0.044]	[0.045]	[0.052]
Public debt ratio in t-1 (in % GDP)		0.002**																				
		[0.001]																				
Primary balance in t-1 (% GDP, WEO)			-0.014***																			0.011**
			[0.004]																			[0.004]
Inflation in t (average yoy, %)				0.017***																		
				[0.005]																		
Inflation if higher than 4%					0.007*																	
					[0.004]																	
Output gap in t-1 (in %)						-0.008**																-0.006
						[0.003]																[0.004]
Real GDP growth in t-1 (in %)							-0.005*															
							[0.003]															
ECB i-rate, main refinancing operation								-0.112***														-0.116***
								[0.028]														[0.030]
Real policy rate									-0.009**													
									[0.005]													
Export quality index										4.271**												
										[2.097]												
Nation: Independent body sets budget assumptions											-0.111**											
											[0.051]											
Nation: Independent body monitors implementation												-0.066**										
												[0.033]										
Adjustment planned in t+1 (pp GDP)													0.010***									
													[0.003]									
Gov't medium term adjustment plan (pp GDP/year)														0.028**								0.051***
														[0.012]								[0.016]
2yr-rolling gov't latest revision for t+1 estimate (pp GDP)															0.014*							
															[0.008]							
Yearly average forecast error for t+1 (pp GDP)																0.022***						0.033***
																[0.004]						[0.005]
Yearly average for. error with first t+1 estimate (pp GDP)																	0.020***					
																	[0.004]					
2yr-rolling for. error with first t+1 estimate (pp GDP)																		0.011***				
																		[0.004]				
Uncertainty index																			0.291**			
																			[0.130]			
Political color of government (Schmidt index; R, C, L for right, center, left)																				-0.007*		
																				[0.004]		
Share of gov't from Left party																					-0.000*	
																					[0.000]	
Resid share of public debt (percent)																						0.001**
																						[0.000]
Number of numerical fiscal rules																						0.012**
																						[0.006]
Constant	0.281***	0.164***	0.271***	0.255***	0.286***	0.292***	0.294***	0.287***	0.253***	-4.008*	0.353***	0.361***	0.276***	0.274***	0.304***	0.266***	0.260***	0.270***	0.256***	0.299***	0.292***	0.157***
	[0.034]	[0.060]	[0.035]	[0.036]	[0.035]	[0.035]	[0.035]	[0.035]	[0.027]	[2.082]	[0.052]	[0.054]	[0.034]	[0.035]	[0.038]	[0.036]	[0.038]	[0.041]	[0.042]	[0.036]	[0.035]	[0.056]
Observations	3,866	3,803	3,803	3,803	3,803	3,803	3,803	3,866	3,803	2,246	1,814	1,998	3,866	3,866	3,495	3,542	3,194	2,919	3,469	3,866	3,866	3,031
Number of ccode	27	26	26	26	26	26	26	27	26	27	21	25	27	27	27	27	27	27	23	27	27	23
Fixed effects	CYM	CYM	CYM	CYM	CYM	CYM	CYM	CYM	YM	CYM	CYM	CYM	CYM	CYM	CYM	CYM	CYM	CYM	CYM	CYM	CYM	YM
Heterosked	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Autocorr	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	0.011	0.048	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.002	0.029	0.002	0.004	0.001	0.000	0.000	0.829
Wald Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Modif. Wald	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Breusch-Pagan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-1.000	-1.000	-1.000	0.000	0.000	0.000	0.000	0.000	-1.000	0.000	0.000	0.000	0.000
Serial	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Same conventions as Table 1.

Table H.6: *Determinants of cyclically-adjusted credibility*

	Base	InitialConditions							Institutions		Policy							Combined
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Credibility in t-1	0.793***	0.790***	0.790***	0.792***	0.766***	0.789***	0.731***	0.791***	0.789***	0.791***	0.772***	0.790***	0.786***	0.763***	0.761***	0.795***	0.798***	0.771***	0.753***
	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.013]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.011]	[0.011]	[0.010]	[0.011]	[0.012]	[0.012]
Release of new target for t+1 (dummy)	-0.307***	-0.308***	-0.303***	-0.306***	-0.302***	-0.307***	-0.268***	-0.306***	-0.306***	-0.305***	-0.305***	-0.307***	-0.307***	-0.284***	-0.276***	-0.337***	-0.364***	-0.347***	-0.329***
	[0.022]	[0.022]	[0.022]	[0.022]	[0.022]	[0.022]	[0.025]	[0.022]	[0.022]	[0.022]	[0.022]	[0.022]	[0.022]	[0.024]	[0.024]	[0.023]	[0.025]	[0.027]	[0.025]
= 1 when election occurs	-0.002	-0.002	-0.002	-0.000	0.003	-0.001	-0.019	-0.000	-0.001	-0.002	0.002	-0.002	-0.001	0.001	-0.010	-0.004	-0.004	-0.024	-0.010
	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.030]	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.027]	[0.029]	[0.028]	[0.029]	[0.031]	[0.033]	[0.030]
(mean) IMFprog_review	0.004	-0.005	0.006	0.000	-0.034	0.007	0.019	0.000	-0.024	-0.002	-0.024	-0.012	0.011	0.064	0.050	0.001	0.005	-0.014	0.020
	[0.046]	[0.046]	[0.046]	[0.046]	[0.048]	[0.046]	[0.086]	[0.046]	[0.048]	[0.046]	[0.048]	[0.047]	[0.047]	[0.050]	[0.048]	[0.047]	[0.049]	[0.048]	[0.058]
Public debt ratio in t-1 (in % GDP)		0.000***																	
		[0.000]																	
Primary balance in t-1 (% GDP, WEO)			-0.009***																-0.006
			[0.003]																[0.005]
Inflation in t (average yoy, %)				0.008*															
				[0.004]															
Output gap in t-1 (in %)					-0.017***														-0.017***
					[0.004]														[0.004]
Real GDP growth in t-1 (in %)						-0.008***													
						[0.003]													
Sovereign yield (10 yr, Bloomberg)							0.020***												
							[0.006]												
Real policy rate								-0.008*											
								[0.005]											
IMFprog									0.037**										
									[0.016]										
Budget balance rule at the national level (1), supranational level (2), or both										-0.022*									
										[0.013]									
Debt rule at the national level (1), supranational level (2), or both (3)											-0.107***								
											[0.033]								
Gov't medium term adjustment plan (pp GDP/year)												0.022**							0.004
												[0.011]							[0.017]
Yearly average gov't latest revision for t+1 estimate (pp GDP)													-0.025***						
													[0.007]						
2yr-rolling gov't latest revision for t+1 estimate (pp GDP)														-0.018**					
														[0.008]					
24m-rolling gov't latest revision for t+1 estimate (pp GDP)															-0.033***				
															[0.008]				
Yearly average forecast error for t+1 (pp GDP)																0.009***			0.001
																[0.004]			[0.005]
Yearly average for. error with first t+1 estimate (pp GDP)																	0.009**		
																	[0.004]		
2yr-rolling for. error with first t+1 estimate (pp GDP)																		0.019***	
																		[0.004]	
ECB i-rate, main refinancing operation																			-0.038
																			[0.032]
Resid share of public debt (percent)																			0.000
																			[0.000]
Number of numerical fiscal rules																			-0.002
																			[0.006]
Constant	0.263***	0.234***	0.267***	0.248***	0.266***	0.280***	0.338***	0.248***	0.259***	0.326***	0.578***	0.259***	0.263***	0.282***	0.282***	0.273***	0.290***	0.326***	0.299***
	[0.026]	[0.028]	[0.026]	[0.027]	[0.036]	[0.027]	[0.040]	[0.027]	[0.026]	[0.045]	[0.107]	[0.026]	[0.026]	[0.026]	[0.026]	[0.027]	[0.029]	[0.030]	[0.056]
Observations	3,875	3,811	3,811	3,811	3,811	3,811	2,841	3,811	3,875	3,875	3,875	3,875	3,843	3,490	3,529	3,551	3,203	2,918	3,055
Number of ccode	27	26	26	26	26	26	21	26	27	27	27	27	27	27	27	27	27	27	23
Fixed effects	YM	YM	YM	YM	CYM	YM	CYM	YM	YM	YM	CYM	YM	YM	YM	YM	YM	YM	YM	YM
Heterosked	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Autocorr	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	1.000	0.189	0.119	0.214	0.024	0.246	0.065	0.197	0.429	0.260	0.080	0.649	0.383	0.437	0.553	0.711	0.501	0.846	0.925
Wald Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Modif. Wald	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Breusch-Pagan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-1.000	0.000
Serial	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Same conventions as Table 1.

Table H.7: *Determinants of cyclically-adjusted credibility*

	Base	Initial Conditions					Economic		Institutions			Policy				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Credibility in t-1	0.215***	0.201***	0.209***	0.208***	0.146**	0.211***	0.255***	0.486***	0.213***	0.199***	-0.269***	0.197***	0.201***	0.377***	0.389***	0.267***
	[0.051]	[0.052]	[0.051]	[0.051]	[0.060]	[0.051]	[0.055]	[0.058]	[0.052]	[0.052]	[0.080]	[0.051]	[0.054]	[0.047]	[0.050]	[0.059]
(mean) new_t1	-0.624	-0.591	-0.663	-0.532	-1.517***	-0.676	-1.331**	0.110	-0.848*	-0.565	-0.780*	-0.916*	-0.841*	-0.837**	-0.414	-0.105
	[0.470]	[0.475]	[0.457]	[0.468]	[0.550]	[0.458]	[0.562]	[0.469]	[0.481]	[0.470]	[0.418]	[0.483]	[0.474]	[0.399]	[0.442]	[0.460]
(mean) election	0.211	0.142	0.263	0.167	-0.154	0.261	-0.013	0.261	0.133	0.218	-0.255	0.105	0.068	0.164	0.406	0.436
	[0.274]	[0.278]	[0.273]	[0.273]	[0.269]	[0.273]	[0.305]	[0.517]	[0.275]	[0.273]	[0.491]	[0.264]	[0.264]	[0.310]	[0.349]	[0.342]
(mean) pb_1t		-0.031**														
		[0.015]														
(mean) cpi_t			0.059***													
			[0.016]													
(mean) cpi_high_t				0.033**												
				[0.014]												
(mean) yd_10y					0.039***											
					[0.014]											
(mean) i_real_t						-0.061***										
						[0.017]										
(mean) debtResid							-0.005*									
							[0.003]									
(mean) Xdiversification								-0.101*								
								[0.060]								
(mean) lngdppc_t									0.414**							
									[0.203]							
(mean) fr_ER										-0.164*						
										[0.098]						
(mean) fc_indptAssmpt											-0.513**					
											[0.240]					
(mean) rev_2y_t1												0.048**				
												[0.021]				
(mean) rev_24m_t1													0.046*			
													[0.025]			
(mean) err_yr_t1														0.077***		
														[0.012]		
(mean) err_1st_yr_t1															0.073***	
															[0.013]	
(mean) err_1st_2y_t1																0.060***
																[0.014]
Constant	0.497***	0.460***	0.394***	0.496***	0.614***	0.391***	0.875***	0.377**	-3.916*	0.831***	0.352	0.570***	0.537***	0.373***	0.345***	0.367***
	[0.124]	[0.122]	[0.126]	[0.125]	[0.130]	[0.126]	[0.198]	[0.171]	[2.164]	[0.234]	[0.340]	[0.133]	[0.132]	[0.084]	[0.088]	[0.096]
Observations	313	308	308	308	236	308	269	177	308	313	145	286	295	286	257	236
Number of ccode	27	26	26	26	21	26	23	24	26	27	19	27	27	27	27	27
Fixed effects	CY	CY	CY	CY	CY	CY	CY	Y	CY	CY	Y	CY	CY	Y	Y	Y
Heterosked	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Autocorr	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	0.019	0.014	0.003	0.010	0.000	0.003	0.022	0.577	0.016	0.028	0.129	0.001	0.003	0.832	0.580	0.322
Wald Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Modif. Wald	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Breusch-Pagan	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
Serial	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Same conventions as Table 1.