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World uncertainty and national fiscal balances

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ABSTRACT

The Great Recession and the COVID-19 pandemic shared two of its critical macroeconomic consequences: a major increase in world uncertainty and great stress on public finances. In this paper, we show that not only these are not independent phenomena but, on the contrary, world economic uncertainties are relevant in determining country-specific fiscal balances. We provide consistent evidence for 143 countries over the period 1990–2019 that the former harms fiscal balances irrespective of the degree of economic development. In this way, an increase of 0.1 points in the world uncertainty index triggers, on average, 0.15 GDP percentage points deterioration in the fiscal balance. This average value is subject to significant non-linearities characterized by larger negative effects the higher the fiscal balance is. In a critical period in which public debts have climbed to unprecedented historical levels, economic stability appears as a non-negligible factor in the forthcoming process of public accounts rebalancing.

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1. Introduction

Uncertainty has become a new certainty. As new technologies and global interconnection have developed, society's conscience of uncertainty and its consequences seem to have grown in parallel. This can be perceived in the new techniques and technologies that are continuously developed to improve decision-making processes, most notably connected to the use of artificial intelligence. Among the new research areas that such developments have prompted in economics, a significant one for this paper lies in the emergence of new measures of risk and uncertainty. Giglio et al. (2016) examine how systemic risk and financial distress affect economic activity. Departing from the wide variety of proxies for systemic risk presented in the literature, more than 30, they propose two procedures for aggregating information and construct a synthetic index with robust predictive power for the distribution of macroeconomic shocks. Baker et al. (2016) develop a new index of

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Economic Policy Uncertainty (EPU) and use it to explore both firm-level performance and its negative consequences over investment, output, and employment. Ahir et al. (2022) develop a World Uncertainty Index (WUI) with country-individual coverage for 143 economies, with extensions taking the form of a World Trade Uncertainty Index (WTUI) and a World Pandemic Uncertainty Index (WPUI). Altig et al. (2020) also propose a Twitter-based economic uncertainty index (TEU), while Altig et al. (2022) create a Survey of Business Uncertainty (SBU) based on subjective information collected from a panel of firms.¹

The availability of uncertainty indices has spurred studies on the impact of uncertainty on key economic dimensions. For instance, the impact of EPU on asset prices and financial markets (Brogaard et al., 2020) and CO2 emissions (Atsu & Adams, 2021, Adams et al., 2020); its different effects on advanced versus emerging economies (Kumar et al., 2021); the impact of the WTUI on oil prices and commodities (Karabulut et al., 2020); and the negative impact of world uncertainties (WUI) on domestic credits (Gozgor et al., 2019), on output, FDI and investment, and productivity (Ahir et al., 2022, Azimli, 2022, Nguyen et al., 2022), and business cycle synchronization in Europe (Crespo Cuaresma, 2022).

In this regard, a significant area of analysis has not been well studied yet but deserves utmost attention from the profession. That is the issue of uncertainty and its potential effect on public sector imbalances. The Global Financial Crisis (end of 2008 onwards) and the COVID-19 pandemic (end of 2019 – 2021) were globally unexpected shocks with a twofold characteristic: on the one side, they both raised global uncertainty; on the other side, they brought relentless pressure on public finances, with long-lasting consequences in the form of indebtedness (Afonso et al., 2022). The goal of this research, therefore, is to explore whether uncertainty and public indebtedness are connected and appraise to what extent global economic uncertainty has had a direct impact on national fiscal balances in recent decades.

It should be noted that there is another strand of literature backing the studies that dig into the diverse macroeconomic impacts of uncertainty indices. This literature has examined the mechanisms through which economic agents define their behavior, and it is crucial to understand the channels running from uncertainty to fiscal revenues and public expenditures. The fact that economic agents are forward-looking implies that expectations of tomorrow's events are critical for today's decisions. Think, for example, on firms' decisions involving investment or households' decisions involving consumption. As optimal choices depend on forward-looking expectations, uncertainty becomes an indispensable determinant of such decisions. The negative impact of "cautionary effects" of uncertainty on investment was empirically documented in Bloom (2009) and Bloom et al. (2007), following the developments in Dixit and Pindyck (1994). The impact of uncertainty on consumption was initially studied by Drèze and Modigliani (1972) and has been found to impact severely on household consumption (Coibion et al., 2021) through expectations and precautionary saving (Christelis et al., 2020). In sum, uncertainty lowers consumption and investment, thereby growth and employment,

¹In addition to these indices, uncertainty is related to volatility and may be apprehended through uncertainty shocks (Bloom, 2009, Stock and Watson, 2012).

providing the critical channels whereby the fiscal stance deteriorates via eroded public revenues and rising public expenditures.

In a similar vein, our analysis aims to respond to the following key questions. Does economic uncertainty, as quantified in Ahir et al. (2022)'s WUI, hurt countries' fiscal sustainability (FS)? Having capital markets become global, and formal quantitative easing programs been on the run for the last years, does this negative impact increase with interest rate payments on public debt? Does the negative impact of economic uncertainty on FS rise along with the reduction in public surplus and the increase in public deficit? Is the negative effect of economic uncertainty on FS more significant in low- and middle-income countries? To what extent does the long-run negative impact of economic uncertainty on FS tend to increase with respect to its short-run impact?

To respond to these questions, we estimate a set of static and dynamic empirical equations with the exogenous variables expressed in current values, but also lagged once to rule out the possibility that our main findings may be affected by potential endogeneity issues. Our empirical evidence is based on linear panel data estimation techniques, but we also use conditional and unconditional quantile regressions to check for the potential existence of non-linearities on the uncertainty-fiscal balance nexus. In addition, we present GMM estimates to show the robustness of our findings to alternative estimation methods.

The paper's main result is the negative association between economic uncertainty and the national fiscal balances. We find that an increase of 0.1 points in the WUI triggers, on average, results in 0.15 GDP percentage points deterioration in the fiscal balance. This negative association is significant across major world regions (East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, North America, South Asia, Sub-Saharan Africa) and, therefore, not specifically driven by the level of economic development even though income plays a twofold role. On the one side, per capita income appears to be a significant control throughout the analysis, with a positive association to the fiscal balance as a relevant enhancer of fiscal revenues. On the other side, the impact of economic uncertainty on low- and middle-income countries is more extensive than in high-income countries.

Moreover, we find that uncertainty is especially harmful in situations of high surplus and tends to be less harmful when the surplus is lower. As a high surplus brings up the fiscal space for government intervention,² governments with balanced accounts have the potential to react more aggressively to negative economic shocks, thereby becoming more responsive to situations of uncertainty. Conversely, the degree of manoeuvre of economies already struggling to re-balance their public accounts become even more limited when facing situations of economic turmoil and uncertainty. On this account, note that the positive association between recessions and uncertainty is well established (Bloom, 2014). A final aspect of our analysis is the relevance of dynamics, with a long-run impact of world uncertainty on national fiscal balances that tend to double in the long-run relative to the short-run.

This paper should be seen as complementary to Gozgor et al. (2019). We focus on the WUI impact on public sector performance – as summarized by the fiscal balance –, while

²The fiscal space is defined by the IMF as the "extent to which a government can generate and allocate resources for a given purpose without prejudicing liquidity or long-term public debt sustainability".

Gozgor et al. (2019) focus on the WUI impact on private sector performance – as summarized by domestic credits (e.g., financial development). Moreover, in connecting global uncertainties with national fiscal balances, we take a step forward with respect to Kumar's *et al.* (2021) finding of a significant domestic spillover of international uncertainty. In doing so, we show the general validity of this connection for a set of 143 economies and a sample period covering the years 1990–2019.³

In addition, the paper provides empirical evidence on the critical channels through which the fiscal stance deteriorates with uncertainty. To the best of our knowledge, this is the first attempt to address relevance of the channels running from uncertainty to both fiscal revenues and public expenditures.

Policy-wise cooperation to enhance stability and minimize uncertainty appears as a much-needed factor to endorse the deleveraging process that the economies will have to face in the coming years. Awareness of the harmful impact of world uncertainty on national fiscal balances adds to the available evidence on the negative impact on domestic credits and its far-reaching implications for households and firms (Gozgor et al., 2019). Both the private and the public sectors would benefit from world uncertainty minimization, as we know they benefit from policy uncertainty minimization (Baker et al., 2016).

The rest of the paper is organized as follows. Section 2 deals with the hypotheses building, empirical strategy, and estimation methodology. Section 3 presents various sets of results. Section 4 checks for robustness, and Section 5 concludes.

2. Hypotheses, empirical modeling, and estimation process

2.1. Hypotheses

Uncertainty implies being unsure of what will happen in the future. It is partial blindness that forces economic agents to respond and cover themselves against the unknown and unpredictable. Employees, consumers, and households may increase precautionary savings (Christelis et al., 2020); whereas employers and managers become more cautious in their expansionary projects, thus reducing risk-taking; in turn, banks and other financial institutions are likely to reduce credit (Gozgor et al., 2019, Danisman et al., 2020). What is, in this context, the government reaction?

To respond to this question, we focus on the public surplus/deficit as it is the most comprehensive measure of public sector performance summarizing the revenue and expenditure sides of governments' action. In this context, we consider three standard measures of public surplus/deficit. The reference one is the fiscal balance (FBY), which is the most comprehensive measure including net interest payments on public debt. Then, there is the primary balance (PBY), which excludes net interest rate payments on public debt; while, as a robustness check, we also consider the cyclically-adjusted balance (CBY) as it abstracts from the influence of automatic stabilizers. Automatic stabilizers are one of the mechanisms used by governments to counter the adverse impact of business cycle fluctuations on vulnerable individuals and households. We consider the cyclically-adjusted balance to exclude the possibility that the cyclicity of public revenues and

³Kumar *et al.* (2021) distinguish between international and domestic uncertainty, the former accruing from the US and having macroeconomic effects on India beyond those accruing from the latter.

expenditures associated with the automatic stabilizers is driving our results. Note that the CBY excludes net interest rate payments on public debt, as the PBY also does.

Our first hypothesis (H1) is the following: Economic uncertainty has a negative impact on fiscal sustainability (FS), where FS comprises the three measures of public surplus/deficit (FBY, PBY, and CBY). Given that precautionary savings affect the demand side, and commercial and financial firms' risk aversion affect the supply side of the economy, tax revenues are likely to suffer together with economic uncertainty. In addition, we know well since the European sovereign-debt crisis that took place in the aftermath of the global financial crisis, that governments are subject to a *risk premium* penalty whenever investors become concerned with their fiscal sustainability (Bernoth et al., 2012). This leads us to the second hypothesis (H2): The negative impact of economic uncertainty on FS increases in line with interest rate payments on public debt. To empirically test this hypothesis, we compare the impact of economic uncertainty on PBY and FBY, which differ among them in terms of the interest payments on public debt. Hence, comparing the sensitivities across the two measures enable us to infer the extent to which consideration of interest rate payments on public debt boosts or lessens the impact of uncertainty on the performance of public sector accounts. We are also interested in the potential existence of non-linearities, as unbalanced situations in public accounts may translate into a larger vulnerability in times of economic uncertainty. On this account, our third hypothesis (H3) is: The negative impact of economic uncertainty on FS increases along with the reduction in public surplus and the increase in public deficit, as rebalancing measures become more difficult to be implemented successfully in uncertain times.

Given the potential of our database, two additional issues deserve analysis. The first one is to exploit the cross-section dimension of the panel to enquire whether the negative impact of economic uncertainty on FS increases for the low and middle-income countries relative to the high-income ones. Accordingly, we propose the following fourth hypothesis (H4): The negative impact of economic uncertainty on FS is larger in the low and middle-income countries than in the high-income ones on account, again, of the enhanced vulnerability arising from a situation of larger public imbalances in the low and middle-income countries relative to the high-income ones (recall Table 1). The second further issue deserving attention is to exploit the time series dimension of our panel to explore to what extent the long-run negative impact of economic uncertainty on FS is larger than its short-run impact. Hence our fifth and final hypothesis (H5): The long-run negative impact of economic uncertainty on the fiscal balance is substantially larger than the short-run impact on account of the persistence that characterizes macro-economic time-series such as public revenues and expenditures (as a percent of GDP). Confirmation of this hypothesis would complement the findings for 132 economies in Afonso et al. (2010) that the fiscal policy is more persistent than responsive to economic conditions, thereby limiting its short-run scope.

2.2. Empirical modelling

To assess the impact of economic uncertainty on national fiscal sustainability, we follow the strategy of recent studies with a similar focus. Our basic Equation (1) mimics the work by Gozgor et al. (2019), who test the impact of world uncertainty on domestic

Table 1. Descriptive Statistics, 1990–2019.

Variable	Description	Obs.	Mean	SD	Min	p25	p50	p75	Max
High Income Countries									
PBY	Primary balance, % of GDP	1151	0.105	7.907	−186.794	−1.914	.005	2.094	28.569
FBY	Fiscal balance, % of GDP	1199	−1.294	7.701	−151.309	−4.091	−2.031	.762	43.304
CBY	Cyclically-adjusted balance, % of GDP	1148	−1.337	6.285	−52.302	−4.116	−1.877	.579	41.025
WUI	World Uncertainty Index	1290	0.200	0.155	0.000	.089	.163	.276	1.434
M2	M2 Money supply, % of GDP	763	83.395	57.068	20.653	49.397	66.709	92.215	403.380
PSCY	Domestic credit to private sector, % of GDP	1234	117.328	66.875	6.714	59.503	117.950	163.000	334.700
FDII	FDI inflows, % of GDP	1228	4.535	8.332	−40.330	.904	2.355	4.904	86.589
TRADE	Trade openness, % of GDP	1214	95.423	67.172	16.014	57.896	78.302	107.725	442.620
INFL	CPI inflation, %	1151	0.105	7.907	−186.794	−1.914	.005	2.094	28.569
GDPPC	GDP per capita, constant USD	1199	−1.294	7.701	−151.309	−4.091	−2.031	.762	43.304
Low- and Middle-Income Countries									
PBY	Primary balance, % of GDP	2513	−0.597	5.695	−80.629	−2.507	−.733	1.280	32.502
FBY	Fiscal balance, % of GDP	2564	−2.595	5.839	−80.629	−4.550	−2.414	−.444	32.502
CBY	Cyclically-adjusted balance, % of GDP	2063	−2.668	4.199	−30.976	−4.526	−2.616	−.733	30.772
WUI	World Uncertainty Index	3000	0.211	0.200	0.000	.069	.155	.293	1.672
M2	M2 Money supply, % of GDP	2750	41.541	33.977	2.857	2.478	31.875	49.368	259.166
PSCY	Domestic credit to private sector, % of GDP	2753	27.908	27.676	0.198	9.122	18.881	38.348	205.600
FDII	FDI inflows, % of GDP	2885	3.311	5.561	−37.155	.765	2.118	4.208	103.337
TRADE	Trade openness, % of GDP	2771	69.789	34.092	0.021	45.697	62.547	88.649	311.354
GDPPC	GDP per capita, constant USD	2941	2903.829	2885.030	164.337	785.503	1686.923	4145.854	15186.830

Table 2. Panel granger-causality tests.

H0: Does not Granger-causality	p-value	H0: Does not Granger-causality	p-value
WUI → PBY	.0008	PBY → WUI	.8025
WUI → FBY	.0001	FBY → WUI	.7547
WUI → CBY	.0000	CBY → WUI	.5539

Granger non-causality in heterogeneous panel data models, using the methodology developed by Juodis, Karavias, and Sarafidis (2021).

credit. This empirical approach is also followed by Danisman et al. (2020) and William and Fengrong (2022) who test the impacts of political uncertainty, respectively, on bank credit and technological innovation. Moreover, to cover against potential endogeneity issues, Gozgor et al. (2019) and Danisman et al. (2020) consider an empirical specification such as (2) with a lagged impact of uncertainty.

Table 3. Pooled OLS and fixed-effects estimations.

VARIABLES	Equation 1				Equation 2	
	Pooled OLS		Driscoll and Kraay FE		System GMM	
	PBY	FBY	PBY	FBY	PBY	FBY
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged Dependent	-	-	-	-	.5293**	0.6376**
	-	-	-	-	[1.221]	[12.404]
WUI	-1.4808**	-2.5067**	-.9917*	-1.4628**	-.6958+	-0.8066*
	[-3.624]	[-4.305]	[-2.358]	[-3.328]	[-1.718]	[-2.043]
M2	-.0173**	-0.0293**	-.0928**	-0.0875**	-.0092*	-0.0126**
	[-4.626]	[-8.658]	[-5.448]	[-5.735]	[-2.003]	[-2.652]
PSCY	-.0184**	-0.0051	-.0031	0.0104	-.0088+	-0.0034
	[-2.615]	[-0.668]	[-.357]	[1.145]	[-1.884]	[-0.643]
FDII	.0083	0.0044	.0262+	0.0467**	.0008	-0.0016
	[.522]	[0.300]	[1.947]	[3.124]	[.075]	[-0.153]
TRADE	.0171**	0.0206**	.0486**	0.0524**	.0100**	0.0093**
	[5.910]	[6.337]	[5.651]	[6.595]	[3.527]	[3.944]
INFL	-.0070**	-0.0066*	-.0035*	-0.0040*	-.0026	-0.0013
	[-3.218]	[-2.194]	[-2.450]	[-2.410]	[-.457]	[-0.292]
LGDPPC	1.4231**	1.3178**	4.2522**	3.7334**	.6684**	0.5275**
	[-1.4808**]	[4.083]	[4.376]	[3.614]	[3.733]	[2.862]
Constant	-6.7349**	-11.1087**	-29.1320**	-30.1162**	-2.6995*	-3.8085**
	[-2.703]	[-4.238]	[-4.689]	[-4.603]	[-2.291]	[-3.054]
Country effects			Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,777	2,839	2,777	2,839	2,688	2,750
Countries	119	120	119	120	119	120
R ²	.1342	0.1363	.1090	0.1241		
AR1					<.002	<0.002
AR2					.177	0.170
Hansen J-test					.278	0.342

Driscoll and Kraay (1998), Vogelsang (2012), and Clustered-robust t-statistics in brackets w.r.t to Eq.1 and Eq.2, respectively.

** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

Even if we follow the practice in related literature, it is important to acknowledge that the lag of uncertainty can be considered exogenous only in a narrow sense, along the lines of Granger causality. To check on this issue, we have conducted Panel Granger Causality tests, which clearly confirm the direction of causality from uncertainty to the different measures of the fiscal stance (see Table 2, below). Beyond single-equation estimations of models (1) and (2), we consider GMM system estimation to take further account of potential endogeneity issues (Table 3). Finally, as a robustness check, we allow the empirical equations to take a richer dynamic structure by considering all exogenous variables lagged (these complementary results are presented in Table A2 in the Appendix). As we explain below, both the GMM estimates and the extra dynamic specifications confirm the hypotheses tested and reinforce the robustness of the negative association between uncertainty and the fiscal stance.

$$FS_{it} = a_0 + a_1 Uncertainty_{it} + \sum_{j \in J} \delta_j X(j)_{it} + \eta_i + \gamma t + \epsilon_{it} \quad (1)$$

$$FS_{it} = \beta_0 + \beta_1 FS_{it-1} + \beta_2 Uncertainty_{it} + \sum_{j \in J} \delta_j X(j)_{it} + \eta_i + \gamma t + \epsilon_{it} \quad (2)$$

Subscripts i and t identify country and year, respectively. FS_{it} is a measurement of the fiscal stance or fiscal sustainability, for which we consider FBV, PBV, and CBV. We use the WUI developed by Ahir et al. (2022) for economic uncertainty. Vector $X(j)$ comprises a set of j macroeconomic indicators. η_i stands for country fixed effects to control for country-heterogeneities, while γt is a linear trend accounting for long-run time effects. As we have data covering 30 years of observations, we are bound to estimate a trend coefficient. The alternative of using country-specific time dummies is disregarded as the large amount needed would result in inconsistent estimates.

The set of considered controls is standard and has been widely used in related literature (Lee and Chang, 2009, Gozgor et al., 2019, Danisman et al., 2020, Bilgin et al., 2020, William and Fengrong, 2022, Mawejje and Odhiambo, 2020, Nguyen et al., 2022). Given our focus on fiscal policy, our first control variable aims to account for the monetary policy's effects by using broad money supply (M2), as a percent of GDP, and CPI inflation (INFL). An expansionary monetary policy resulting in inflation may destabilize the fiscal discipline (Catão & Terrones, 2005, Davig et al., 2011, Minea and Tapsoba, 2014). In particular, for a sample of 107 countries over 1960–2001, Catão and Terrones (2005) show “a strong positive association between fiscal deficits and inflation among high-inflation and developing country groups, but not among low-inflation advanced economies”. Given the composition of our sample, which is biased towards low- and middle-income countries, and the expectation of a positive impact of money supply on inflation, we expect a negative impact of money supply on fiscal sustainability.

Next, we include domestic credit to the private sector (PSCY), as a percent of GDP, which should boost economic activity and could have a positive effect on a given level of uncertainty which, we know from Gozgor et al. (2019) and Danisman et al. (2020), is in turn affected negatively by uncertainty. Recent empirical evidence suggests that fiscal imbalances in developing countries increase along with financial development (Gnimassoun & Do Santos, 2021).

The impact of the global economic environment is captured via FDI inflows (FDII) and trade openness (TRADE), also defined as a percent of GDP. High FDI inflows should strengthen fiscal sustainability via their impact on government revenue (Kimm Gnanon, 2017), while the evidence on the effects of trade openness on budget deficits is still inconclusive (Combes & Saadi-Sedik, 2006, Chowdhury et al., 2016). We also consider the influence of real income per capita (GDPPC), expressed in constant USD and defined as a logarithm, to control for the positive effects on fiscal sustainability derived from larger per capita income levels.

2.3. Estimation methods

We conduct the econometric analysis by estimating linear and non-linear models. In the first case, we use panel data estimation, while in the second case we resort to conditional and unconditional panel quantile analysis to be able to appraise whether the impact of

economic uncertainty on fiscal sustainability varies at different levels of public deficit or surplus.

Given that we are dealing with an unbalanced panel database characterized by large $N \approx 143$ and medium-size $T \approx 30$, equations (1) and (2) can be estimated by applying a linear fixed-effects panel data models (e.g., Gozgor et al., 2019, Danisman et al., 2020). As thoroughly discussed in N. Beck and Katz (2011) and N. L. Beck et al. (2014), any panel endogeneity bias should vanish whenever the size of T becomes large enough, as in our case. Nonetheless, a large T does not rule out the possibility of being affected by cross-sectional and time dependence issues. This is the reason why we compute modified robust standard errors for heteroskedasticity, autocorrelation, and spatial correlation as developed in Driscoll and Kraay (1998) and Vogelsang (2012).⁴

Regarding the dynamic specifications, we test them by conducting system GMM estimation with collapsed instruments (Arellano & Bover, 1995; Blundell & Bond, 1998; and Roodman, 2009) and then correct the standard errors to mitigate the small sample bias (Windmeijer, 2005) and cross-sectional heteroscedasticity (Colin Cameron & Miller, 2015). In addition, for robust validations, it is necessary to alter the control sets and adjust the outliers to apprehend the magnitude of the economic uncertainty impacts.

The use of linear panel data models aims to estimate the effects of economic uncertainty on the mean values of the budgetary balance, which may differ depending on the levels of public deficit or surplus. To check the nonlinear effects of economic uncertainty, it may be worth studying its potential different impact at the critical quantiles delivered by the 25th, 50th, 75th, and 90th percentile of the fiscal balance distribution. The conditional quantile regression (CQR) framework for panel data developed by Koenker (2004), nonetheless, does not provide the same coefficient interpretation as the OLS method (Borah & Basu, 2013, Alejo et al., 2021). Instead, Firpo et al. (2009) suggested that one can have the same OLS interpretation on the unconditional quantile regression (UQR)'s coefficients by simply replacing the outcome variable of interest with its appropriate recentered influence function; upon which further developments by Budig and Hodges (2014), Killewald and Bearak (2014) and Borgen (2016) gave rise to a fitting fixed-effects UQR panel model.

2.4. Data

Our database combines several sources. Data on the World Uncertainty Index (WUI) is obtained from the database developed by Ahir et al. (2022) covering 143 countries with information from 1990 to 2020 (we use the version updated on 2021-Oct-14). Data on public sector accounts are obtained from the comprehensive World Bank's database on the Fiscal Space developed by Kose *et al.* (2017). In particular, we gather data on the Primary balance (PBY), the Fiscal balance (FBY), and the Cyclically-adjusted balance (CBY), all three expressed as a percent of GDP. Positive signs denote a surplus, while negative signs denote a deficit. Then, we take data from the World Development Indicators on the controls related, respectively, to the monetary policy (broad money supply or M2) and its macroeconomic outcomes (CPI inflation and domestic credit to

⁴Beside these, the Driscoll-Kraay algorithm deals with unbalanced panel data appropriately. We apply the Hoechle (2007)'s Stata command *xtscc* and its extended version, *xtsccfixedb*, by Vogelsang (2012).

the private sector, or INFL and PSCY, respectively), the degree of internationalization (FDI inflows and Trade openness, or FDII and TRADE, respectively), and level of development (Real GDP per capita, or GDPPC). It should be, however, noted that the effective sample timespan is limited to the period from 1990 to 2019 due to missing values.

Table 1 provides descriptive statistics of these variables by distinguishing between high-income and low plus middle-income countries. Following the World Bank's *Country and Lending Groups* classification for the fiscal year 2021, the high-income group in the dataset consists of countries with the Gross National Income (GNI) per capita higher than \$12,696, while the low- and middle-income countries comprise those with GNI per capita of \$12,696 or less. As shown in Appendix A0, the first set includes 42 economies, while the second set comprises 97 economies.

The first important observation is that uncertainty displays similar levels in both groups, with an average of 0.208 in the high-income countries, 0.215 in the low- and middle-income countries, and similar standard deviation and maximum values.⁵ On the contrary, the fiscal balance has different magnitudes overall and by quintiles. If we take as reference the 3% limit for public deficit in the European Union, both sets of countries enjoyed a sustainable situation, on average, between 1990 and 2020. In the high-income countries, the fiscal balance was -1.5% , while it was -2.74% in the low- and middle-income countries. Of course, this does not exclude particular negative situations, as the minimum values reveal.⁶

By quartiles, the situation is also systematically worse in the low- and middle-income countries. When we take as reference the 25% of the countries with the worse fiscal balance (the highest public deficit), the average for the high-income countries is -4.357% , while the average for the low- and middle-income countries is -4.748% ; for the second quartile covering the range 26%-50% of the countries with the worse fiscal balance these values are -2.163% and -2.528% , respectively. Public deficits remain, but their magnitudes are approximately half the previous ones. Finally, for the third quartile covering the range 51%-75% of the countries with the worse fiscal balance these values are 0.642% and -0.534% , both very close to balance, but having a surplus in the high-income countries. In addition, note that for all these groups the primary balance is characterized by better figures. This indicates that the burden of interest rate payments on public debt applies to all economies irrespective of their fiscal balance situation.

As mentioned, our empirical analysis faces two potential issues related to the relevance, or not, of a simultaneity bias and the existence of reverse causality. We deal with such potential issues by using GMM system estimation, provide robustness checks in the Appendix,⁷ and further conduct some panel Granger causality tests based on Juodis *et al.* (2021). Table 2 shows the results of such tests, conducted on model specification (2), which point to a single direction of causality running

⁵We work with the raw WUI time series of each economy. The aggregate measure of the WUI is rescaled by multiplying by 1,000,000, hence the much largest numbers of the index when displayed at the institutional webpage (<https://worlduncertaintyindex.com/>).

⁶Below we perform a robustness analysis in which we exclude the three countries with the highest and lowest WUI values. We also exclude the three countries with the highest and lowest FBV values.

⁷Please check Tables A.4, A.5, A.6, A.7 and A.8 in the Appendix.

from uncertainty to the different measures of the fiscal stance, and rule out the possibility of reverse causation.

3. Results

3.1. Aggregate evidence

Table 3 provides initial evidence based on pooled OLS and fixed-effects estimations uncovering significant and robust negative coefficients across definitions of the dependent variable and estimation method. We focus primarily on the results obtained from the fixed-effects model for the fiscal balance (FBY), which allows us to examine total fiscal responses when controlling for country-specific and time-specific heterogeneities.⁸

The reference aggregate estimate of the impact of uncertainty on the fiscal balance is the one displayed in column (4) amounting to -1.4628 . This implies that an increase of 0.1 points in the WUI index is associated to a 0.15 GDP percentage points deterioration in the fiscal balance (which recall is expressed as a percent of GDP): $-0.15 \approx 0.1 * (-1.4628)$. It is not infrequent to see the WUI index doubling, at least, when an international crisis takes place. This occurred, for example, in the aftermath to the 9/11 terrorist attacks and it was only at the end of 2003 that the index went back to their previous levels. According to our reference estimate, a 100% increase in the index implies an additional public deficit (or lower public surplus) of 1.5 percentage points of GDP, which in the referred case lasted for two full years. This is just an example of how harmful world economic uncertainty may be for the public sector accounts in specific turmoil periods, which are periods in which other macroeconomic variables may be also experiencing the consequences of economic instability.

Although close to the FBY coefficient, the corresponding regression for the primary balance (PBY) delivers a lower estimate of the WUI coefficient of -0.9917 (as shown in column (3)). We will see from now on that this smaller sensitivity of PBY is a systematic pattern caused by excluding interest rate payments on public debt, which seems to be a sensitive component of the fiscal balance with respect to economic uncertainty.

In addition to these results, the GMM system estimates on the dynamic equation displayed in columns (5) and (6) point to lower short-run impacts and larger long-run impacts. For the FBY version of the model the estimated coefficients are, respectively, -0.81 and -2.22 , while, for the PBY version, the corresponding values are -0.70 and -1.48 . Overall, the results reported in Table 3 confirm the first two hypotheses driving our analysis. First, as hypothesized through H1, economic uncertainty is detrimental to the fiscal balance and may cause larger public deficits (or lower public surpluses depending on the public account's departure point) and, second, as H2 posits, it seems to be especially harmful along with the rise in interest rate payments on public debt. Below, we pay specific attention to this second point.

Regarding the other variables, the money supply is also associated with a negative influence on fiscal balances, as the monetary and fiscal policies tend to counterbalance one another. Inflation is also negatively associated to a good performance of public sector

⁸Post-estimation Pesaran's (2015) and Juodis and Reese's (2022) tests on the panel residuals show that the null hypothesis of weak cross-sectional dependence cannot be rejected in all model specifications. See Table A.1 in the appendix for additional cross-sectional dependence robust results.

accounts, as it is likely to increase public expenditures (civil servant wages, pensions) by more than public revenues do (for example, VAT revenues may suffer from less expansionary consumption levels triggered by inflation). The availability of domestic credit is innocuous to the fiscal balance, as the public sector has its own sources of funding and access to capital markets. Regarding the external sector, the positive association of FDI inflows with the public sector account is significant only in the current period, while openness to trade has a positive impact via the larger revenues obtained from taxing imported goods and services and the extra profits made on exports. A larger per capita GDP is also a significant enhancer of net public revenues.

Overall, the evidence resulting from the panel Granger Causality tests, the individual and GMM system estimates of equations (1) and (2), and the complementary estimation of equations (1') and (2') in Appendix A1 confirm our main hypothesis according to which there is a stable and significant negative association between world economic uncertainty and the fiscal stance (H1). This finding aligns well with the evidence provided by Jerow and Wolff's (2022) on the negative impact of uncertainty on the efficiency of public expenditures.

3.2. Uncertainty and interest rate payments on public debt

The difference between the fiscal balance and the primary balance is net interest rate payments on public debt. As shown in Table 1, the difference between these two magnitudes accounts for more than one percentage point of public deficit in developed countries and two percentage points in developing countries. The relevant magnitude of these payments on average across the world points to interest rate payments on public debt as a potential critical candidate to channel the effects of uncertainty on government indebtedness.

To clarify the potential relevance of this issue, consider the identity describing debt dynamics, as explained in Fischer & Easterly (1990):

$$\Delta \frac{PD_t}{Y_t} = \underbrace{\frac{PB_t}{Y_t}}_{Term1} + \underbrace{i_t * \frac{PD_{t-1}}{Y_{t-1}}}_{Term2} - \underbrace{\Delta Y_t * \frac{PD_{t-1}}{Y_{t-1}}}_{Term3} - \underbrace{\frac{QE_t}{Y_t}}_{Term4} \quad (3)$$

Note that Y_t denotes Gross Domestic Product in nominal terms, PB_t the primary balance, PD_t public debt, i_t nominal interest rates, QE_t quantitative easing, and Δ is the difference operator. As Equation (3) shows, terms 1 and 2 convey the two channels through which uncertainty may contribute to increase public debt which, in turn, affects the fiscal balance via the resulting interest rate payments on public debt. Terms 3 and 4 account for the debt dilution that takes place with the acceleration in (nominal) economic growth and money creation to finance public debt.⁹

⁹Term 4 on the right-hand side of Equation (3) is expressed in terms of Quantitative Easing, while Equation (3) in Fischer and Easterly (1990, p. 135) is expressed in terms of seignorage. Fischer and Easterly (1990) point to seignorage as the part of public debt that is financed by printing money; here we refer to quantitative easing as the part of public debt that ends up in a Central Bank balance sheet as the collateral of new cash.

Having explored the impact of economic uncertainty on the fiscal balance, we now enquire whether the larger impact on FBY arises mainly from the primary balance (term 1) or from interest rate payments on public debt (term 2). This will allow us to disentangle the channels through which economic uncertainty causes more damage on public accounts. If term 2 is found to be relevant, then the monetary-fiscal policy nexus would be strengthened through uncertainty, as interest rates are one of the two driving forces of term 2. This connection would add to the already complex management of the monetary policy when setting the official interest rate, and it would also provide further reasons why country risk premia should be kept as low as possible during economic turmoil periods.

Table 4 shows the results when the government debt ratio or GGDY (expressed as percent of GDP) is added to the set of controls in our reference Equation (1). The influence of economic uncertainty remains negative and significant, with estimated coefficients close to the reference ones: -0.9259 when the dependent variable is the primary fiscal balance (close to the reference -0.9917), and -1.3069 (rather than -1.4629) when FBY instead is the dependent variable. The estimated coefficients on money supply, trade and per capita income remain significant, while inflation ceases to be significant.

The influence of government debt is negative, as expected, meaning that larger levels of public debt contribute to worsening the fiscal balance either because they tend to reduce the surplus or to increase the deficit. Results in Table 4 confirm that consideration

Table 4. Fixed-effects estimates when controlling for government debt (GGDY).

VARIABLES	Driscoll and Kraay		System GMM	
	PBY	FBY	PBY	FPY
	(1)	(2)	(3)	(4)
Lagged Dependent	-	-	.5222**	.5122**
	-	-	[12.575]	[7.391]
WUI	-.9259**	-1.3069**	-.6465*	-1.0617**
	[-3.277]	[-2.846]	[-1.981]	[-2.764]
GGDY	-.0121+	-0.0189**	-.0321+	-.0411*
	[-1.903]	[-3.256]	[-1.970]	[-2.415]
M2	-.0766**	-0.0767**	-.0008	-.0033
	[-7.317]	[-7.358]	[-.109]	[-.370]
PSCY	-.0025	0.0081	-.0096	-.0049
	[-.322]	[0.967]	[-1.651]	[-.675]
FDII	.0001	0.0083	-.0085	-.0059
	[.003]	[0.349]	[-.789]	[-.437]
TRADE	.0451**	0.0486**	.0080+	.0103**
	[5.245]	[5.676]	[1.716]	[2.955]
INFL	.0015	-0.0021	.0135+	.0158*
	[.414]	[-0.668]	[1.915]	[2.113]
LGDPCC	3.7211**	2.5837**	.4698**	.4217*
	[3.819]	[2.636]	[3.178]	[2.224]
Constant included	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes
Observations	2,539	2,579	2,486	2,528
Countries	118	119	118	119
AR1			<.001	<.001
AR2			.150	.152
Hansen J-test			.402	.500

Driscoll and Kraay (1998), Vogelsang (2012), and Clustered-robust t-statistics in brackets w.r.t to Eq.1 and Eq.2, respectively. ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

of interest rate payments on public debt generates a larger sensitivity of fiscal sustainability with respect to economic uncertainty (-1.3069 with FBY versus -0.9259 with PBY) and provide further support to H2. In addition, these results allow us to infer some extra information by comparing these sensitivities (in the presence of debt) with the ones displayed in Table 3, in which there was no control for the quantity of debt (-1.4628 with FBY versus -0.9917 with PBY).¹⁰

In fact, this increased sensitivity (i.e., the additional impact when considering interest rate payments on public debt) may be driven by three potential outcomes as shown by term 2 in equation (5): (i) rises in the quantity of debt, for a given interest rate; (ii) rises in the interest rate, for a given quantity of debt; or (iii) a mix of (i) and (ii). In this context, when we add public debt as a control variable, the difference between the results with respect to the case with no control for public debt helps us to infer to what extent (ii) is driving the result (recall that (ii) is “for a given quantity of debt”, which precisely holds when government debt is added as a control variable). The falling difference between the coefficients obtained having either FBY or PBY as a dependent variable, which goes from -0.47 (in Table 3) to -0.38 (in Table 4, when the quantity of debt is accounted for) suggests that the increase in interest rate payments account for close to 20% ($= 0.09/0.47$) of the larger impact of uncertainty on the fiscal balance. In other words, the larger impact of economic uncertainty on FBY arises mainly from the primary balance (term 1 in Equation (3), which accounts for 80% of the increased impact), with a non-negligible impact of interest rate payments on the public debt (term 2 in Equation (3), which accounts for the remaining 20%). It follows that holding low stocks of public debt helps blocking inertia in public imbalances, as it cushions the negative consequences of economic uncertainty on the current fiscal balance. These results could explain why, under certain conditions, the negative response of private consumption and investment to fiscal consolidation may be (partially) reversed, as it is found in Afonso et al. (2022). The mechanism would be the reduction in uncertainty brought about by the expected lower interest rates achievable via the reduced levels of public debt resulting from the fiscal contraction.

3.3. The role of non-linearities in the impact of economic uncertainty on the fiscal balance

Having as reference the results displayed in column (4), Table 3, we run conditional and unconditional quantile regressions to disentangle potential differences in the uncertainty impact across the distribution of the fiscal balance. The conditional quantile regression (CQR) method has been widely used in recent years to examine the effect of a covariate along the entire distribution of the data rather than estimating mean effects, as OLS does. However, as quantile regression generates results that are often not interpretable for the entire population distribution, unconditional quantile regression is becoming increasingly popular. The reason is that unconditional quantile regression (UQR) marginalizes the effects over the distributions of other covariates in the model and delivers a more interpretable outcome (Firpo et al., 2009).

¹⁰In the appendix, Table A.4 shows consistent estimates for Equation (2') in Appendix A2. Table A.5 displays the reliable estimates of equation (1'') and (2'') with CBY as the dependent variable.

Table 5. Conditional fixed-effects quantile estimates.

VARIABLES	Primary balance, % of GDP (PBY)				Fiscal balance, % of GDP (FBY)			
	q = 0.25	q = 0.50	q = 0.75	q = 0.90	q = 0.25	q = 0.50	q = 0.75	q = 0.90
WUI	-0.5786 [-1.187]	-0.9920** [-2.648]	-1.3870** [-2.846]	-1.7264* [-2.521]	-1.1797* [-2.444]	-1.4650** [-3.958]	-1.7478** [-3.519]	-1.9623** [-2.875]
M2	-0.1072** [-7.260]	-0.0928** [-8.166]	-0.0790** [-5.347]	-0.0671** [-3.234]	-0.0974** [-8.092]	-0.0874** [-9.465]	-0.0775** [-6.256]	-0.0700** [-4.113]
PSCY	-0.0009 [-0.096]	-0.0031 [-0.453]	-0.0053 [-0.589]	-0.0071 [-0.566]	0.0092 [1.161]	0.0105+ [1.727]	0.0117 [1.445]	0.0127 [1.139]
FDII	0.0156 [0.671]	0.0262 [1.462]	0.0362 [1.556]	0.0449 [1.371]	0.0467* [2.169]	0.0467** [2.824]	0.0466* [2.101]	0.0465 [1.527]
TRADE	0.0455** [5.877]	0.0486** [8.151]	0.0514** [6.636]	0.0539** [4.947]	0.0502** [7.008]	0.0524** [9.548]	0.0546** [7.417]	0.0563** [5.565]
INFL	-0.0028 [-0.699]	-0.0035 [-1.155]	-0.0043 [-1.067]	-0.0049 [-0.869]	-0.0035 [-0.852]	-0.0040 [-1.283]	-0.0046 [-1.083]	-0.0050 [-0.858]
LGDPCC	5.0019** [5.209]	4.2517** [5.757]	3.5347** [3.681]	2.9186* [2.163]	4.0031** [4.473]	3.7313** [5.436]	3.4619** [3.758]	3.2576* [2.574]
Constant	-0.0748** [-3.081]	-0.0733** [-3.930]	-0.0719** [-2.963]	-0.0707* [-2.072]	-0.0208 [-0.848]	-0.0354+ [-1.882]	-0.0499* [-1.975]	-0.0608+ [-1.754]
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,777	2,777	2,777	2,777	2,839	2,839	2,839	2,839
Countries	119	119	119	119	120	120	120	120

t-statistics in brackets. ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

Table 5 shows the results for the CQRs, for both the two dependent variables FBY and PBY. Once more, the stability of the results is noticeable, with a solid negative and significant impact of uncertainty on the fiscal balance no matter the quantile under scrutiny. Note, in particular, that the estimated coefficients, for the FBY and PBY respectively at the median, amount to -1.4650 and -0.9920 and almost coincide exactly with the reference means in columns (4) and (3), in Table 3.

In addition, the results in Table 5 reveal a lower sensitivity of the fiscal balance with respect to uncertainty for the 25% of the countries with the worse fiscal balance, while this sensitivity is larger the better the situation of public accounts is. Hence, the estimated WUI coefficient amounts to -1.7478 for $q = 0.75$, while it further enhances its impact to -1.9623 for the countries at the top decile ($q = 0.90$) regarding the fiscal balance. These results provide empirical support to H3.

The reason why best performers are likely to be more sensitive to uncertainty is inherent to their leadership as best fiscal balance performers. As the literature on debt sustainability has shown (recently Beqiraj et al., 2018, Daniel & Shiamptanis, 2022), the perils surrounding an excessive public deficit, especially in times of liquidity constraints as the sovereign debt crisis proved in Greece, provide every incentive to hold a structurally equilibrated fiscal balance. Therefore, as the degree of maneuver of economies caught in a public deficit situation is lower than the one of economies with more balanced public accounts, responses to uncertainty and other sources of economic turmoil are inherently limited by the factors that have led them to this situation, which are likely to be aggravated along with increasing levels of uncertainty. For example, Daniel & Shiamptanis (2022) stress the role played by interest rates (which tend to increase with uncertainty and its impact on country-risk premia), in determining debt sustainability and, as a consequence, the probability of debt default. In sharp contrast, the larger the surplus in the fiscal balance is, the more it brings up the fiscal space for government

Table 6. Unconditional fixed-effects quantile regressions.

VARIABLES	Primary balance, % of GDP (PBY)				Fiscal balance, % of GDP (FBY)			
	q = 0.25	q = 0.50	q = 0.75	q = 0.90	q = 0.25	q = 0.50	q = 0.75	q = 0.90
WUI	-0.3494 [-0.777]	-0.5910+ [-1.685]	-1.3805** [-2.778]	-1.8886* [-2.125]	-1.1048* [-2.239]	-1.8887** [-2.591]	-1.0269* [-2.267]	-3.5538** [-3.551]
M2	-0.0442**	-0.0307**	-0.0576**	-0.1412**	-0.0535**	-0.0411**	-0.0493**	-0.1039**
PSCY	[-5.631]	[-4.848]	[-5.834]	[-4.897]	[-7.230]	[-7.425]	[-6.121]	[-4.242]
	-0.0020	-0.0142**	-0.0119	0.0196	0.0086	0.0073	0.0072	0.0409*
FDII	[-0.309]	[-2.897]	[-1.353]	[1.026]	[1.481]	[1.409]	[0.989]	[2.444]
	-0.0035	0.0137	0.0345*	-0.0166	0.0116	0.0118	0.0470**	0.0761+
TRADE	[-0.232]	[1.127]	[2.015]	[-0.553]	[0.655]	[0.886]	[3.035]	[1.873]
	0.0350**	0.0330**	0.0469**	0.0575**	0.0441**	0.0377**	0.0451**	0.0851**
INFL	[6.087]	[7.793]	[7.024]	[3.992]	[7.743]	[8.717]	[7.720]	[4.620]
	-0.0035	-0.0031	-0.0023	0.0007	-0.0054	-0.0033	-0.0029	-0.0024
LGDPPC	[-1.308]	[-0.976]	[-0.877]	[0.107]	[-1.142]	[-1.064]	[-1.173]	[-0.378]
	2.1898**	2.2453**	2.2525**	5.4401**	1.6728**	1.1095*	1.7025**	4.6218**
	[4.300]	[5.504]	[3.959]	[3.455]	[2.968]	[2.567]	[3.001]	[3.132]
Constant	-16.8916**	-14.0215**	-10.9355**	-31.1286**	-17.8896**	-10.4456**	-12.5170**	-32.3395**
	[-4.747]	[-4.788]	[-2.899]	[-2.947]	[-4.428]	[-3.505]	[-3.203]	[-3.048]
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,777	2,777	2,777	2,777	2,839	2,839	2,839	2,839
Countries	119	119	119	119	120	120	120	120

Bootstrapped t-statistics in brackets. ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

intervention, thereby providing an enhanced capacity to respond to shocks and counteract the harmful effects of uncertainty.

The interpretation of the CQRs coefficients, however, deserves one additional consideration. The CQRs indicate that the impact of the WUI index can soar by a third for the top fiscal balance performers (-1.9623 versus -1.4650). This means that economies that have unusually large positive fiscal balances given their observables show a larger sensitivity with respect to uncertainty than those that have fiscal balances closer to the mean. This does not say, however, whether this still holds for economies with large positive fiscal balances *independently* of their observables. This void in the interpretation of CQRs is solved by the unconditional quantile regression, whose results are presented in Table 6.

As Table 6 shows, the sensitivity with respect to global uncertainty can increase even further when the good performers get away from the average economy and have twice the average surplus (-3.5538 versus -1.9623). The UQRs reveals, therefore, that differences in the impact of WUI on fiscal balances are not only observed after controlling for our set of controls related to macroeconomic conditions, degree of internationalization, and financial development, but that this impact is associated to the relative performance of the fiscal balance in a way that the unconditional impact is much larger at the positive extreme of the distribution. Conversely, the impact at the low quintiles is lower than the average and quite homogeneous across countries.

3.4. Do country-level income differences matter?

The large number of cross-section units allows us to focus on the potential existence of regional differences. We start by systematically checking the stability of our results when excluding specific groups of countries belonging to the following areas: East Asia and Pacific (EAS), Europe and Central Asia (ECS), Latin America and Caribbean (LCN), Middle East and North Africa (MEA), North America (NAC), South Asia (SAS), and Sub-Saharan Africa (SSA). Our focus is restricted to the reference specification provided in column (4), Table 3, which is re-estimated in the absence of each of these regions and presented in Table 7 (see also Table A.7 in Appendix A2 for corresponding dynamic estimates).

The impact of uncertainty on the fiscal balance remains negative and significant and, in most cases, relatively close of our reference estimate of -1.4623 . We find the greatest divergence when the EAS and SSA countries are left out from the analysis, in which case the estimated coefficient becomes lower, especially when the group of poorest African economies is excluded (-0.9681). On the contrary, when the LCN countries are the ones left out from the analysis, the coefficient increases to -1.8063 . Since these two are among the three groups with more economies comprised (the third one being the ECS countries), it is possible that sample composition effects are driving the results although it may still be the case that income differences play a role in the way global uncertainty affects the performance of national public accounts.

To explore this last issue, we split our sample among high-income and low- and middle-income countries and re-estimate. With respect to the latter group, the key coefficient displayed in column (4) of Table 8 shows a coefficient of -1.4003 , very much close to our aggregate reference estimate of -1.4623 . This result should come as

Table 7. Fixed-effects estimates in the absence of selected regions.

	Excluded region:						
VARIABLES	EAS FBY	ECS FBY	LCN FBY	MEA FBY	NAC FBY	SAS FBY	SSA FBY
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
WUI	−1.1279* [−2.406]	−1.6372** [−3.240]	−1.8063** [−3.017]	−1.4004** [−3.039]	−1.4543** [−3.276]	−1.6625** [−3.805]	−0.9681** [−2.730]
M2	−0.1347** [−6.769]	−0.0865** [−4.594]	−0.0950** [−5.424]	−0.0487** [−4.615]	−0.0917** [−5.862]	−0.0876** [−5.609]	−0.0916** [−5.973]
PSCY	0.0048 [0.432]	0.0072 [0.604]	0.0143 [1.555]	0.0078 [0.894]	0.0129 [1.451]	0.0098 [1.047]	0.0113 [1.069]
FDII	0.0253+ [1.706]	0.0596* [2.447]	0.0499** [3.255]	0.0259* [1.994]	0.0471** [3.155]	0.0460** [3.074]	0.0850** [3.628]
TRADE	0.0565** [5.178]	0.0517** [5.750]	0.0507** [6.126]	0.0413** [8.083]	0.0534** [6.833]	0.0531** [6.573]	0.0564** [6.222]
INFL	−0.0027 [−1.352]	−0.0118 [−1.589]	−0.0038* [−2.129]	−0.0058** [−4.162]	−0.0039* [−2.334]	−0.0038* [−2.270]	−0.0018 [−1.013]
LGDPCC	3.9540** [3.653]	3.6475** [2.846]	3.7107** [3.272]	2.0676** [2.717]	3.7144** [3.607]	3.8643** [3.833]	5.0302** [4.045]
Constant included	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,402	2,258	2,345	2,515	2,797	2,702	2,015
Number of groups	103	95	100	105	118	115	84

Driscoll and Kraay (1998), Vogelsang (2012) t-statistics in brackets. ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

Region: East Asia and Pacific (EAS), Europe and Central Asia (ECS), Latin America and Caribbean (LCN), Middle East and North Africa (MEA), North America (NAC), South Asia (SAS), Sub-Saharan Africa (SSA).

Table 8. Fixed-effects estimates of Equation (1) by country-level of income.

	High Income		Low & Middle Income	
	PBY	FBY	PBY	FBY
	(1)	(2)	(3)	(4)
WUI	.0995 [.080]	-0.8886 [-0.774]	-1.1323** [-3.122]	-1.4003** [-3.706]
M2	-.0934** [-5.599]	-0.0928** [-6.851]	-.1075** [-5.229]	-0.1071** [-5.817]
PSCY	-.0189* [-2.179]	-0.0022 [-0.234]	.0045 [.349]	0.0118 [1.077]
FDII	.0633* [2.247]	0.0679* [2.652]	.0120 [1.056]	0.0287+ [1.877]
TRADE	.0774** [3.875]	0.0621** [6.719]	.0412** [4.594]	0.0424** [4.834]
INFL	.1072+ [1.850]	0.0859+ [1.766]	-.0045** [-2.789]	-0.0048* [-2.475]
LGDPCC	7.9544+ [1.892]	8.9803* [2.210]	4.3476** [4.415]	3.8652** [3.645]
Constant included	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes
Observations	634	678	2,143	2,161
Countries	26	27	93	93

Driscoll and Kraay (1998), Vogelsang (2012) t-statistics in brackets. ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

no surprise, as most of the sample comprises low- and middle-income countries. In contrast, column (2) points to the absence of sensitivity in high-income countries. Following this outcome, income levels per se would not be driving our results, which is

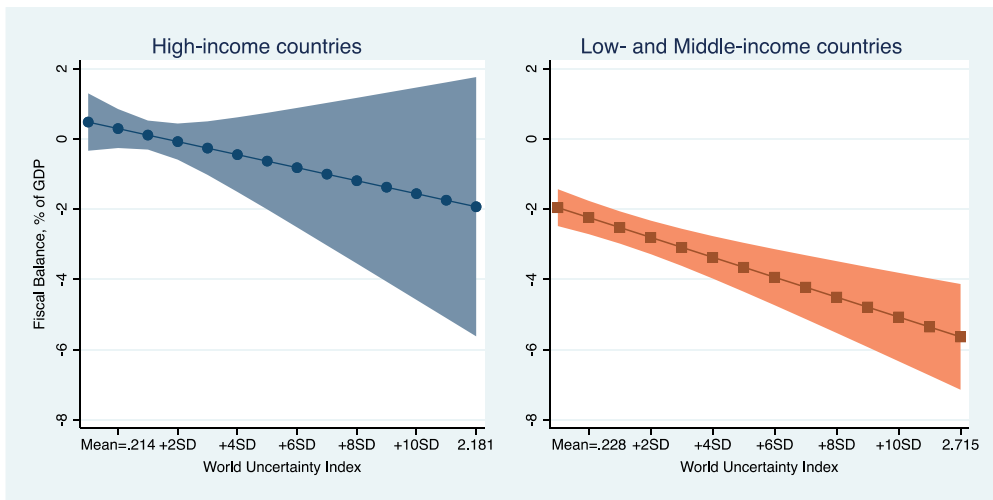


Figure 1. Projecting fiscal balance trajectories.

relieving given that per capita GDP is significant. We conclude that this variable seems to be the right control to account for country differences in income.¹¹

To complete the analysis, [Figure 1](#) illustrates the differences in the fiscal balance trajectories of the high-income countries (left panel) and the low- and middle-income countries (right panel) by projecting the impact of the running mean plus additional standard deviations in the WUI over the sample range taken by the fiscal balance. All other variables are kept at their mean. The resulting trajectories are statistically significant in low- and middle-income countries, with relatively large impacts on the fiscal balance, while in high-income countries the impact is statistically indistinguishable from zero. These findings offer empirical validation for H4 and, in addition, confirm differences between high and low- and middle-income countries that have been recently documented in [Afonso et al. \(2022\)](#) regarding the fiscal consolidation – macroeconomic outcomes nexus.

3.5. To what extent does the fiscal balance impact of economic uncertainty rise in the long-run?

The analysis in [Gozgor et al. \(2019\)](#) and [Danisman et al. \(2020\)](#) is based on two empirical specifications, which are equivalent to our equations (1') and (2') in the first case (see [Appendix A2](#)), and (1) and (2') in the second one. [Gozgor et al. \(2019\)](#) report information on their estimation of the dynamic equation, but they only pay attention to the short-run coefficients and never to the information provided by their long-run coefficients. In turn, [Danisman et al. \(2020\)](#) only report information on their estimation of the static equation and their focus is on the short-run coefficients (no estimate with a lagged dependent variable is ever shown, in contrast to [Gozgor et al., 2019](#)).

¹¹See also [Table A.3](#) and [A.7](#) in [Appendix A2](#).

We compute the long-run coefficients from the information reported in Table 3. Under the assumption that the steady state can be reached and time subscripts play no role, the estimated long-run impacts are -2.220 ($= -0.8066/(1-0.6367)$) with PBY as dependent variable (column (5)) and -1.478 ($= -0.6928/(1-0.7086)$) with FBY as dependent variable (column (6)). These values imply that the long-run impact of economic uncertainty on the fiscal balance is around one-half the short-impact when we take as reference Equation (1).¹² For FBY it is -2.220 instead of -1.4628 , while for PBY it is -1.478 instead of -0.9917 . Hence, an increase of 0.1 points in the world uncertainty index would trigger a total of 0.22 GDP percentage points deterioration in the fiscal balance ($0.22 = 0.1 \times (-2.22)$) on average, under the assumption that the steady state can be reached with no further change. Note that when controlling for the public debt, as in the estimation reported in Table 4, the corresponding long-run estimates of PBY and FBY remain highly stable reaching values of -1.353 and -2.177 , respectively. No matter the angle, it becomes evident that the data strongly substantiates H5.

Overall, the critical lesson we take from this further analysis is the warning on the long-run consequences of economic uncertainty and, consequently, the call to keep as short as possible any period of increased world uncertainty to avoid self-protracted periods of fiscal tensions (self-protracted on account, among other things, of the persistence induced by interest rates payments on public debt as discussed in Section 3.2).

4. Robustness

We conduct robustness checks that include (i) restricted samples; (ii) replication of the results for the third measure of the fiscal balance, CBY, which abstracts from the influence of business cycles dynamics and automatic stabilizers; and (iii) varying the set of macroeconomic controls. As shown below, the estimated impact of economic uncertainty on the fiscal balance remains stable across the robustness checks performed (see also tables presented in Appendix A3).

4.1. Restricted samples

We consider restricted cross-section samples in which the extreme values are removed. To select these values, we average the WUI over each year for each country (\overline{WUI}_i), and then remove the economies with values within the 5% lowest average uncertainty ($\overline{WUI}_i > \overline{WUI}_{i,q=0.05}$), within the 95% highest average uncertainty ($\overline{WUI}_i < \overline{WUI}_{i,q=0.95}$), and simultaneously all values within these two extreme groups ($\overline{WUI}_{i,q=0.05} < \overline{WUI}_i < \overline{WUI}_{i,q=0.95}$). Results are presented in Table 9 (see also Table A.8 in Appendix A2 for corresponding dynamic estimates).

In the first case, the key coefficient is virtually unchanged (-1.4477 versus the reference -1.4628), while in the second and third cases the sensitivity increases in the absence of the economies with highest levels of WUI. The fact that less uncertainty is associated to a somewhat narrower average responsiveness of fiscal balances is another indication of the harmful effects of global uncertainty.

¹²Please note that the estimation of the dynamic specification, equation (2'), can be found in Table A.2 in the appendix. These results align with the findings reported in Table 3.

Table 9. Fixed-effects estimates of Equation (1) in the absence of extreme sample observations.

VARIABLES	$WUI_i > WUI_{i,q=0.05}$		$WUI_i < WUI_{i,q=0.95}$		$WUI_{i,q=0.05} < WUI_i < WUI_{i,q=0.95}$	
	PBY	FBY	PBY	FBY	PBY	FBY
	(1)	(2)	(3)	(4)	(5)	(6)
WUI	-1.0334*	-1.4477**	-1.1800*	-1.7044**	-1.2323*	-1.6948**
	[-2.427]	[-3.279]	[-2.301]	[-3.188]	[-2.300]	[-3.087]
M2	-.0919**	-0.0887**	-.1038**	-0.0922**	-.1031**	-0.0936**
	[-5.206]	[-5.513]	[-5.692]	[-5.581]	[-5.444]	[-5.349]
PSCY	-.0023	0.0107	-.0023	0.0094	-.0014	0.0098
	[-.270]	[1.129]	[-.267]	[0.988]	[-.163]	[0.984]
FDII	.0287*	0.0476**	.0249+	0.0467**	.0274*	0.0478**
	[2.112]	[3.132]	[1.915]	[3.090]	[2.090]	[3.082]
TRADE	.0487**	0.0557**	.0497**	0.0533**	.0498**	0.0568**
	[5.727]	[6.513]	[5.938]	[6.787]	[6.022]	[6.739]
INFL	-.0036*	-0.0040*	-.0031*	-0.0035*	-.0032*	-0.0035*
	[-2.543]	[-2.375]	[-2.028]	[-2.235]	[-2.106]	[-2.199]
LGDPPC	4.1792**	3.6745**	4.5944**	3.8253**	4.5281**	3.7726**
	[4.211]	[3.525]	[4.716]	[3.730]	[4.548]	[3.635]
Constant included	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,583	2,645	2,669	2,701	2,475	2,507
Countries	111	112	113	113	105	105

Driscoll and Kraay (1998), Vogelsang (2012) t-statistics in brackets. ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

Table 10. Fixed-effects estimates of the cyclically-adjusted balance (CBY).

	Eq.1: Driscoll and Kraay		Eq.2: System GMM	
	(1)	(2)	(3)	(4)
Lagged Dependent	-	-	0.7704**	0.7267**
			[19.077]	[18.635]
WUI	-1.4277**	-1.2652**	-0.4648+	-0.6563*
	[-2.995]	[-2.656]	[-1.722]	[-2.026]
GGDY		-0.0207*		-0.0181+
		[-2.325]		[-1.842]
M2	-0.0727**	-0.0719**	-0.0082*	-0.0056
	[-7.194]	[-6.832]	[-2.337]	[-1.000]
PSCY	0.0134	0.0123	-0.0003	-0.0017
	[1.404]	[1.344]	[-0.070]	[-0.310]
FDII	0.0286	0.0031	0.0012	-0.0040
	[1.540]	[0.132]	[0.104]	[-0.274]
TRADE	0.0576**	0.0507**	0.0061**	0.0059**
	[9.158]	[8.327]	[3.322]	[2.701]
INFL	-0.0081	0.0006	0.0028	0.0125
	[-1.637]	[0.126]	[0.628]	[1.594]
LGDPPC	0.8544	-0.1120	0.2787*	0.3129+
	[0.714]	[-0.067]	[2.013]	[1.877]
				-0.0056
Constant included	Yes	Yes	Yes	Yes
Countries effects	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes
Observations	2,538	2,309	2,455	2,261
Countries	104	104	104	104
AR(1) Test			<0.001	<0.001
AR(2) Test			0.145	0.130
Hansen J-test			0.600	0.728

Driscoll and Kraay (1998), Vogelsang (2012), and Clustered-robust t-statistics in brackets w.r.t to Eq.1 and Eq.2, respectively. ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

4.2. *Cyclically-adjusted Balance as dependent variable*

Next, we consider the CBY measure as a dependent variable. Our aim is to ascertain that our main claim on the influence of world economic uncertainty on the fiscal balance holds even when the influence of automatic stabilizers is not considered (and, of course, in the absence of net interest rates payments on public debt analogously to the PBY measure).

Regarding Equation (1), Table 10 shows that the estimated WUI coefficients are -1.4277 and -1.2652 , very close to the reference ones for FBY, amounting to -1.4628 and -1.3069 in Tables 3 and 4, respectively. With respect to the estimates of the dynamic equation (2), the same pattern identified in Section 3.5 holds. More specifically, the estimated short-run coefficients are relatively low, reaching values of -0.4648 and -0.6563 , the latter when controlling for public debt, while the long-run elasticities attain also close values of around -2.02 and -2.40 , respectively. We thus confirm the stability of our results when the cyclically-adjusted balance is considered, which shows that confirmation of our empirical hypotheses is robust to all standard measures of the fiscal balance.

4.3. *Varying control sets*

Finally, we consider alternative control variables such as real economic growth (GDPGRW), the current account balance expressed as % of GDP (CURRACC); the official exchange rate, expressed as the local currency per \$US in logarithm (LFX); the lending and deposit interest rates (LENDRATE and DEPORATE, respectively), and the Chinn-Ito financial openness index (KAOPEN).

In the first set of specifications considered in Table 11, economic growth replaces per capita income and LFX is added. This holds for Equation (1) irrespective of whether the dependent variable is PBY or FBY. It can be seen that the estimated coefficients of world uncertainty are very much stable, with values around -1.0934 for PBY (having a reference value just below -1.00) and -1.4314 (with a reference value of -1.4628).

In rows 2, 3 and 4, we sequentially substitute money supply by CURRACC, LENDRATE and DEPORATE, in addition to LFX. With the addition of CURRACC we observe a fall in the estimated value of the WUI, which nevertheless remains negative and significant. In turn, the effect of having the LENDRATE and the DEPRATE is to increase the WUI impact on the fiscal balance, which moves to a range between -1.20 and -1.30 for PBY and remains stable for FBY within a range between -1.40 and -1.44 . In other words, consideration of interest rates instead of money supply tends to increase the sensitivity of the fiscal balance with respect to the WUI in the absence of interest rate payments on public debt in the dependent variable (i.e., when this channel is omitted by using PBY instead of FBY).

Finally, the addition of KAOPEN and LFX, with no replacement regarding the standard set of macroeconomic controls, also tends to enhance the impact of the WUI index to -1.1443 (instead of reference value just below -1.00) and to -1.4940 instead of the reference value of -1.4623 . In a context in which robustness checks

Table 11. Fixed-effects estimates of WUI with different control sets.

Control Variables	Replacement		Addition		Equation (1)	
	LGDPCC	M2	LFX	KAOPEN	PBY	FBY
GDPGRW, %	X		X		−1.0934* [−2.553]	−1.4314** [−3.235]
CURRACC, % of GDP		X	X		−.6473+ [−1.717]	−0.8623+ [−1.806]
LENDRATE, %		X	X		−1.2782** [−3.560]	−1.4049** [−3.264]
DEPORATE, %		X	X		−1.2279** [−2.816]	−1.4389** [−2.845]
KAOPEN			X	X	−1.1443** [−2.945]	−1.4940** [−3.651]
Macroeconomic controls					Yes	Yes
Country effects					Yes	Yes
Time effects					Yes	Yes

Driscoll and Kraay (1998), Vogelsang (2012) t-statistics in brackets. ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$.

GDPGRW denotes real economic growth; CURRACC the current account balance expressed as % of GDP; LFX is the official exchange rate (expressed as the local currency per \$US in logarithm); LENDRATE and DEPORATE are the lending and deposit interest rates, respectively; KAOPEN is the Chinn-Ito financial openness index; macroeconomic controls in all equations include Trade openness (TRADE), FDI Inflows (FDI), Domestic credit to private sector (PSCY), CPI inflation rate (INFL) and/or GDP growth (GDPGRW) depending on whether it substitutes LGDPCC.

confirm the negative and significant coefficient of the economic uncertainty on public accounts, our reference values seem to provide a conservative estimate in most scenarios.¹³

5. Conclusions

When examining the macroeconomic impact of a negative disturbance, shocks on technology, productivity, oil prices, or fiscal and monetary shocks are most often brought into the analysis, leaving risk mainly as a propagation mechanism. In the absence of uncertainty, however, risk would play no role. This is a reason why it is important to consider the role played by uncertainty in shaping macroeconomic outcomes, which the growing availability of quantitative indices of systemic risk, policy uncertainty and world economic uncertainty (Giglio et al. (2016), Baker et al. (2016), Ahir et al. (2022), and Alejo et al (2021, 2022) among others) allows to do.

In this context, an important variable is the country risk premium, which affects the cost of government debt via interest rate payments on public debt. As shown in this paper, this component of public expenditure is particularly sensitive to uncertainty and has great relevance as a transmission mechanism from uncertainty to fiscal balance unsustainability. Given the global move started in 2022 towards higher interest rates to prevent inflation from spiraling out of control, the warning on the harmful effects of uncertainty on the public sector accounts should be taken seriously.

The Great Recession and the COVID-19 pandemic have left high levels of public indebtedness worldwide. Looking backward, the two episodes of high private indebtedness related to the technological and housing bubbles in the nineties and early noughties, respectively, were followed

¹³When we perform this analysis with CBY as the dependent variable, we reach the same conclusions regarding the stability of the results (see Table A.6 in Appendix A2).

by a deleveraging process affecting the progress of consumption, investment, and economic growth. Deceleration would also be the expected outcome today of a most needed rebalancing of public sector accounts were it to take place at a similar speed that in the previous cases. However, the ageing population, the challenge of sustainability, and growing inequalities (each affecting differently different economies) are likely to constrain government deleveraging. This is where uncertainty becomes relevant. For given levels of public deficit and public debt, and for given levels of demographic, environmental, inequality, and business cycle constraints, keeping uncertainty low will contribute to public leverage in the present adverse scenario.

Our results are consistent with the model recently developed by Jerow and Wolff (2022) to explain the negative impact of uncertainty on the efficiency of public expenditures or, in other words, the changing size of the fiscal multiplier in the presence or absence of macroeconomic uncertainty. The main transmission channel from uncertainty to a weaker public outcome is risk aversion, which triggers significant reallocations from consumption to saving decisions, and also in capital markets, in which capital moves away from risky assets thereby delivering “a weaker (even contractionary) output response relative to a government spending increase” (Jerow & Wolff, 2022, p. 2). Further research should aim at disentangling the relevance of the consumption and capital reallocation channels considering the international dimension in which economic agents nowadays operate. This will be helpful in establishing causal relationships running from uncertainty to critical economic outcomes to which this research is pointing at, along the lines of Gozgor et al. (2019) and Danisman et al. (2020).

To face this challenge, a critical outcome of this paper is that the incentive to enhance stability and minimize uncertainty should be shared unanimously by all economies. Awareness of the harmful effects of world uncertainties on national fiscal balances may be another stepping stone toward this aim.

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