Does economic policy uncertainty modify fiscal multipliers in EMEs? Empirical evidence from Mexico

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Abstract

Economic policy uncertainty (EPU) could dampen fiscal policy stimulus, raising challenges for policymakers. Using the Mexican case, this paper studies how EPU modifies the fiscal policy effectiveness in EMEs. I use EPU episodes to estimate state-dependent fiscal multipliers across high and low-uncertainty regimes. I find evidence that a high EPU regime decreases both the spending and public investment multipliers. Those multipliers are lower and differ substantially from those estimated during low uncertainty times. Also, I find that the effect on private investment explains the difference in the size of the multiplier across regimes, as precautionary behaviour during uncertain times is associated with more crowding out.

JEL classification: C32, D81, E62, H62
Keywords: fiscal multiplier, economic policy uncertainty, crowding out.

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Introduction

Economic policy uncertainty (EPU) is a substantial concern in some emerging market economies (EMEs); it may also be another factor that blunts fiscal policy effectiveness. Recent events such as the Great Financial Crisis, the commodity super-cycle, fiscal consolidation episodes, the Covid-19 pandemic, and the war in Ukraine have spurred renewed interest in understanding the effects of fiscal policy. However, the central issue remains the determination of the size, value, and sign of fiscal multipliers, which can vary under different economic conditions.[1] Factors such as the business cycle position, monetary policy stance, public debt levels, exchange rate regimes, and trade openness have been identified as conditions that can modify the output responses to fiscal policy.[2] Nevertheless, another driver that has gained particular relevance due to multiple political episodes, social unrest and, most recently, the Covid-19 pandemic and the war in Ukraine are the levels of economic policy uncertainty. If high EPU levels reverse the effectiveness of economic policies, EPU episodes will increase pressure on policymakers. In particular, deep concerns about economic policy from the private sector could nullify the fiscal policy effects due to a strengthening of the crowding out channel—by generating a precautionary behaviour on private agents that offsets stimulus from expansionary policies. This condition could be exacerbated in EMEs since they tend to be relatively more exposed to—local and external—EPU episodes that impact domestic financial conditions.[3]

I analyse state-dependent fiscal multipliers conditional to economic policy uncertainty within an EMEs approach. I study the case of Mexico to see whether episodes of increased EPU increase or mitigate output responses to fiscal policy in emerging economies. I use local projections (Jordà, 2005) to estimate fiscal multipliers during low versus high uncertainty regimes, finding evidence that EPU episodes substantially decrease the fiscal multiplier by two units, on average. During low uncertainty times, the fiscal multiplier is close to zero through a two-year horizon, consisting of literature of multipliers to EMEs.[4] However, during high uncertainty times, the fiscal multiplier is negative and drops to -2 over the same horizon (Figure 1). Also, to expand the study of how uncertainty affects fiscal policy, I extend the analysis to public investment multipliers. During low uncertainty times, the multiplier is positive and close to 1. During high uncertainty times, the fiscal multiplier drops to -2 (Figure 1). Finally, I study what demand component drives output-response differences across regimes, finding that private investment explains such differences during high and low uncertainty regimes, implying a strong crowding out effect based on the precautionary behaviour of private agents. These results suggest that EPU is another factor that policymakers should include in fiscal policy design in EMEs.

Literature on state-dependent fiscal multipliers under an uncertainty approach is limited. Two recent works have aimed this issue for AEs, leaving the stage ready to extend the literature to study the case of EMEs. Berg (2019) uses vector autoregression (VAR) models to estimate the fiscal multiplier under high and low business uncertainty regimes in Germany, finding that the fiscal policy is most effective when uncertainty is higher and that such difference is larger in the

[1] The fiscal multiplier is defined as how much GDP changes if government spending is increased or the tax rate is reduced.

[2] For examples of the business cycle approach, see Auerbach and Gorodnichenko (2012a), Auerbach and Gorodnichenko (2012b), and Ramey and Zubairy (2018); for zero lower bound regimes, see Ramey and Zubairy (2018) and Miyamoto, Nguyenm, and Sergevey (2018); for high public-debt levels, exchange rate regimes, development levels, and trade openness see Iltzetzki, Mendoza, and Végh (2013), and Banerjee and Zampolli (2019).

[3] Compared to advanced economies (AEs), EMEs suffer much more severe falls in investment and private consumption following exogenous uncertainty shocks (Carrière-Swallow and Céspedes (2013)).

[4] To see more details consult Iltzetzki, Mendoza, and Végh (2013), Contreras and Batelle (2014) and IMF (2018).

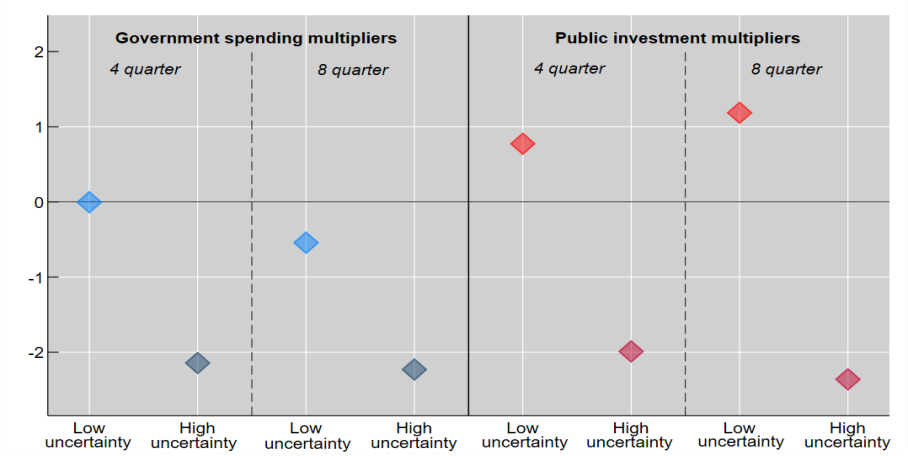


Figure 1: Summary of fiscal multipliers during low and high uncertainty regimes. Blue and red dots are the estimates' simple average at the 4- and 8-quarter cumulative response for each regime. Units are in MXN currency.

long run. On the other hand, IMF (2020) uses growth forecast errors as uncertainty indicator to estimate public investment fiscal multipliers to AEs with local projections, finding that during high uncertainty times multipliers are higher than in low uncertainty periods.[5]

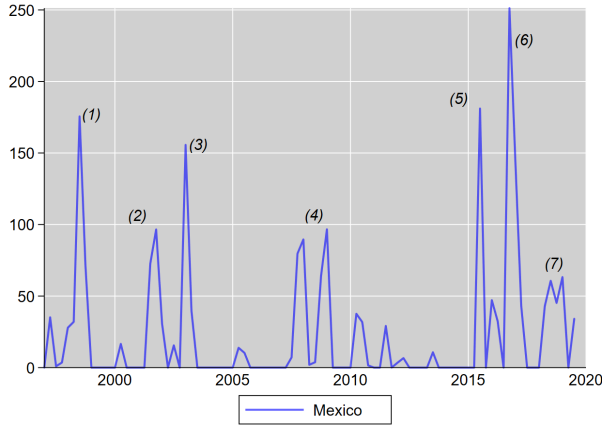
This paper contributes to the literature in showing how fiscal policy effectiveness could be affected by the levels of economic policy uncertainty in EMEs; that, for the best of my knowledge, is the first work showing evidence on this regard. The results suggest that, in contrast to the case of AEs where the fiscal multiplier is higher during a high uncertainty regime, it decreases for the case of EMEs during high uncertainty times. A possible explanation of this difference is the agents´ fresh memory of past crises related to high debt and hyperinflation episodes, which creates less confidence in local policies during high EPU episodes.

Finally, Mexico becomes a natural candidate to show empirical evidence of how EPU affects macroeconomic policies in EMEs given its exposure to external EPU shocks. The strong linkages with the US rise an opportunity to generate exogenous uncertainty states variations. The Trump presidential elections, the NAFTA trade renegotiation and the announcement of a border wall construction to close frontiers are some examples of external EPU increases to the Mexican economy (Figure 2, left-hand panel). All these external EPU episodes in addition to some relevant domestic ones have triggered an extra risk premium relative to other countries in the region (Figure 2, right-hand panel).

The remainder of this paper is structured as follows. Section 1 describes the empirical strategy. Section 2 discusses the data treatment. Section 3 shows the multipliers in high and low uncertainty regimes. The drivers of the aggregate fiscal multiplier effect is presented in section 4. The final section concludes.

[5]This latter is the closest work to this one. However, multiple factors diverge from this paper. First, it focuses on AEs, which differs from the EME approach of this work. Second, it uses the growth GDP forecast errors as an uncertainty measure, making it potentially matching high uncertainty episodes with recession periods. Finally, it focuses exclusively on public investment multipliers, which could behave differently than spending multipliers.

(a) Economic policy uncertainty Index



(b) EMBI spreads

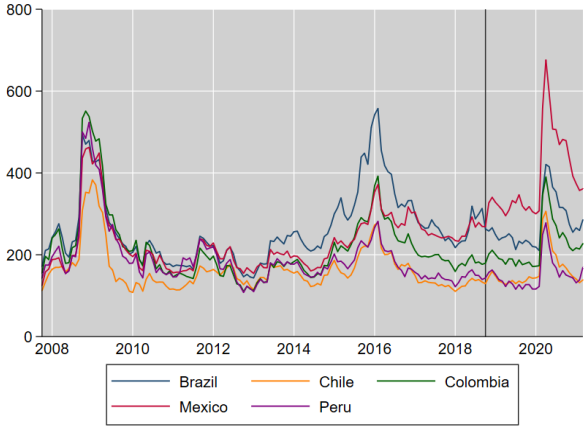


Figure 2: Left-hand panel: Mexico EPU Index represented as $max\ \{0, \frac{MexicoEPU_t - MexicoEPU_{t-4}}{MexicoEPU_{t-4}}\}$. Selected EPU events are (1) the Russian financial crisis beginning, the Hong Kong crisis, the Collapse of Latin American stocks and bonds; (2) 9-11 event, the Dot-com bubble; (3) PEMEX concerns, the Iraq invasion; (4) Great Financial Crisis, oil price collapse, US recession concerns; (5) US elections, US-China trade war, Brexit referendum; (6) Concerns about NAFTA renegotiation, the announcement of the border wall construction; and (7) Cancellation of the New International Airport of Mexico City (NAICM). Units are in percentage changes. Source: Baker, Bloom and Davis (2016). Right-hand panel: Monthly frequency. Units are in basis points. The vertical line indicates 2018m11, the date of the NAICM cancellation announcement. Source: JP Morgan.

1 Empirical strategy

This section first describes the identification strategy I follow to estimate fiscal multipliers and then it shows the econometric specification. Overall, I use the Jordà (2005) local projection method to compute fiscal multipliers, following Ramey and Zubairy (2018) strategy. This single-equation approach is a flexible alternative that does not impose implicit dynamic restrictions that typically enter in VAR models. In addition, this method easily accommodates state dependence outputs (i.e., the method can conveniently accommodate nonlinearities in the response functions).[6]

1.1 Identification strategy

I use the Blanchard and Perotti (2002) shock identification that is widely used in literature. The identification assumes that government spending does not contemporaneously respond to macroeconomic variables. However, output variables respond to government spending shocks in the same period. Recognising the limitations from such identification, the availability of data in Mexico does not allow exploring other identification methods in quarterly frequency (e.g. the narrative approach). However, there is evidence that multipliers estimated under the Blanchard and Perotti method remain close to their peers from other methods (Ramey (2016)). In addition, given that this paper does not aim at the level of the multipliers, but at the differences across regimes, the consistency in the method let me focus on such variation.

Finally, a recent debate about fiscal multiplier estimation discuss the ex-post treatment applied

[6]To see more about the strengths of local projections on fiscal multiplier estimations, see Auerbach and Gorodnichenko (2012a) and Ramey and Zubairy (2018).

to this variable in the conversion of elasticities to multipliers; I address this issue by using Gordon and Krenn's (2010) transformation. The conventional way to estimate the fiscal multiplier is, first, to calculate elasticities using variables in logs. Then, the estimated elasticities must be converted to local-currency equivalents. The procedure uses log variables and an ex-post conversion factor based on the simple average ratio of GDP to government spending, $(\varepsilon_{y,g} \times y/G)$. However, Ramey and Zubairy (2018) find a potential problem using this conversion. The simple average can present a wide variance around the full sample. Thus, the fiscal multiplier under this transformation is quite sensitive to the election of the average ratio.[7] To avoid this bias, I follow Gordon and Krenn's (2010) transformation. I divide the real GDP, government spending, and taxes by the potential GDP instead of taking the variables in logs.[8] This method transforms principal variables in the same units around time to directly estimate the fiscal multiplier in local currency.

1.2 Econometric specification

This subsection first shows the linear approach to estimate fiscal multipliers and then the non-linear approach. I follow Ramey and Zubairy (2018) econometric specification based on instrumental variables to directly estimate cumulative fiscal multipliers. The linear case requires as many regressions as h periods for each dependent variable:

$$\sum_{j=0}^{h} y_{t+j} = \alpha_h + \delta_h(L)X_{t-1} + \theta_h \sum_{j=0}^{h} g_t + trend + v_{t+h} \quad for\ h = 0, 1, 2, ..., N, \tag{1}$$

using the Blanchard and Perotti shock as an instrument for $\sum_{j=0}^{h} g_{t+j}$, that is the sum of the government spending from t to $t+h$ and θ_h is the cumulative multiplier estimated in one-step. $\sum_{j=0}^{h} y_{t+j}$ is the sum of the real GDP variable from t to $t+h$, X is a vector of macroeconomic control variables, $\delta_h(L)$ is the polynomial of the lag operator of order 2, $trend$ is a linear trend variable, and N is the length of the impulse-response function.[9] With this specification, I can directly estimate the fiscal multiplier as a sequence of θ_h coefficients.[10] Finally, the authors state that this one-step IV method has multiple advantages.[11]

[7] They find for the US economy that y/G varies between 2 and 24, with a mean of 8 in a historical sample from 1889-2015. In Mexico, this ratio varies between 5.4 and 9.7, with a mean of 7.1.

[8] Potential GDP was estimated with the Hodrick-Prescott filter.

[9] Lag order was selected considering the trade-off between the freedom´s degree and the sample length. However, different lags were tested, and the main results remain.

[10] Ramey and Zubairy (2018) highlights that this one-step estimate of cumulative multipliers at horizon h is identical to the results from following the conventional three-steps method: (i) first to estimate the equation of the output response to the fiscal shock; (ii) then, to estimate the response of government spending to the fiscal shock and (iii) finally, to compute the multipliers as the ratio of the cumulative sum for each horizon h of both dynamics in steps i and ii.

[11] First, standard errors can be measured straightforwardly. Second, presenting the multiplier as an IV approach highlights the importance of the fiscal shock relevance used and can be checked for different time horizons. Finally, the IV method can rely on several alternative variables to work as instruments for government spending shocks (eg, the Blanchard and Perotti identification shocks, military spending, Bartik shocks, government spending news, and spending forecast errors).

The model can be adapted for the state-dependent approach as:

$$\sum_{j=0}^{h} y_{t+j} = F(z_{t-1}) \left[\eta_{A,h} + \phi_{A,h}(L)x_{t-1} + \theta_{A,h} \sum_{j=0}^{h} g_t \right] \tag{2}$$

$$+ \ (1 - F(z_{t-1})) \left[\eta_{B,h} + \phi_{B,h}(L)x_{t-1} + \theta_{B,h} \sum_{j=0}^{h} g_t \right] + trend + \upsilon_{t+h} \quad for \ \ h = 0, 1, 2, ..., N.$$

$$F(z_t) = \frac{exp(-\gamma z_t)}{1 + exp(-\gamma z_t)}, \quad \gamma > 0, \tag{3}$$

Where $F(\cdot)$ is a transition function that indicates the state of the economy $\{A, B\}$ and assigns weights to each regime and varies between 0 and 1. z is an indicator of the state of the economy when the fiscal expansion occurs, normalised with zero mean and unit variance. $F(z)$ is lagged to avoid contemporaneous feedback from fiscal expansion and each regime's economic condition. This lag avoids potential endogeneity between the state of the economy and fiscal shocks. $F(z)$ can be represented as a dummy variable or as in equation (3) to weigh each state of the economy. Equation (3) smooths each regime transition to avoid abrupt changes with minimum state conditions. γ is a scale-invariant coefficient to calibrate the model for each regime. The higher it is valued, the smoother the transition function.

The model uses $F(z_{t-1}) \times shock_t$ and $(1 - F(z_{t-1})) \times shock_t$ as instruments for the respective cumulative multipliers according to the state of the economy. $\theta_{A,h}$ and $\theta_{B,h}$ coefficients capture the cumulative fiscal multiplier from each regime. Finally, there is only one complication associated with local projections—the possible serial correlation in the error term induced by the successive leading of the dependent variable. Thus, to control for such an effect, I follow the recommendation to use the Newey-West correction for standard errors to compute in one-step fiscal multipliers (Newey and West, (1987)).

2 Data

I use quarterly data from 1997q1 to 2019q4 for the Mexican economy. The baseline model considers five macroeconomic variables: real GDP, government spending, federal taxes, the policy rate, and inflation rate.[12] All relevant variables are in real terms using the GDP deflator.[13] To complete the sample, before 2008 I use the three-month government bond yield to complete the policy rate series.

The baseline model comprises five endogenous variables that face the government budget constraint that are included in vector X. With federal taxes, inflation rate, and policy rate, I control government limitations on fiscal expansions subject to the debt-to-GDP ratio path and the real

[12]Government spending is defined as the sum of government consumption and public investment. Source: INEGI, Banco de México, and Mexican Finance Ministry´s statistics department.

[13]Real GDP, government spending, federal taxes, and the inflation rate are seasonally adjusted using the X-13ARIMA-SEATS method.

cost of deficit issuance. The latter condition likely reduces the fiscal multiplier, given that the estimation without government constraint can overestimate the expansion effect. That is, it takes into account a more comprehensive measure of the available fiscal space.

3 Fiscal multipliers: normal vs uncertainty times

Little is known about fiscal multipliers variation among uncertainty episodes in AEs; in the case of EMEs, even less is known; this is uncharted territory. This section first presents the metrics I use to measure uncertainty. Second, it shows the fiscal multiplier values observed during high and low uncertainty episodes on a broad fiscal policy measure. Finally, a robustness check for the uncertainty states to measure fiscal multipliers is presented. As a main result, I find evidence that the fiscal multiplier decreases when the economy switches from a low-uncertainty to a high-uncertainty regime, particularly in the long term. Also, statistical tests suggest differences in multipliers across regimes. Results hold when I analyse the public investment fiscal multipliers.

3.1 Uncertainty measures and regime construction

I use the Mexico Economic Policy Uncertainty Index (Mexico EPU Index), based on Baker, Bloom and Davis (2016) to construct high and low uncertainty regimes.[14] The Mexico EPU Index deems episodes of domestic but mostly external economic policy uncertainty episodes. I use the annual rate of the Index with quarterly frequency to construct as proposed by Banco de México (2020) (Figure 3, left-hand panel).

Using the annual rate of the Mexico EPU Index as a threshold, I can construct the regime indicator function ($F(z)$) (Figure 3, right-hand panel). While values close to one represent a high uncertainty regime, values close to zero denote a low uncertainty regime. As shown in Figure 3, right-hand panel, it perfectly captures main episodes of high economic policy uncertainty. Also, the graph shows that the high uncertainty regime does not necessarily match with recession periods, avoiding estimations of multipliers in periods of recession and expansion (that is, under a business cycle approach). $\gamma = 4.5$ was calibrated to have a likelihood of 80% on episodes with high uncertainty (i.e. I defined $F(z) > 0.8$ as a high uncertainty regime).[15]

3.2 Baseline results

3.2.1 Government spending multipliers

While the fiscal multiplier during a low uncertainty regime remain close to zero, during a high uncertainty regime it largely decreases to negative values (Figure 4, left-hand panel). The spending multiplier during a low uncertainty regime is negative and close to zero over a two-year horizon, but is not statistically different from zero. That is, during low uncertainty times, the fiscal multiplier does not have an impact on GDP. In contrast, the fiscal multiplier during a high uncertainty regime is negative and statistically different from zero after a three-quarter horizon. It has a value of -2.6 during the first year—after this, it remains around -2.7 over a three-year horizon. To verify if there is a statistical difference in the fiscal policy effectiveness across this approach for EMEs, I compute

[14] They adapt the index to Mexico with keywords on local newspapers and set words in three groups: 1) *Económica, Economía*, 2) *regulación, déficit, presupuesto, Banco de México, Los Pinos, Congreso General, legislación, ley, arancel, impuesto, tributación, militares, Guerra, guerras, la Fed* and 3) *incierto, incertidumbre.*

[15] Different values close to 4.5 to γ were tested, and estimates are remain insensitive.

(a) Mexico EPU Index

(b) Weight on high uncertainty regime $F(z)$

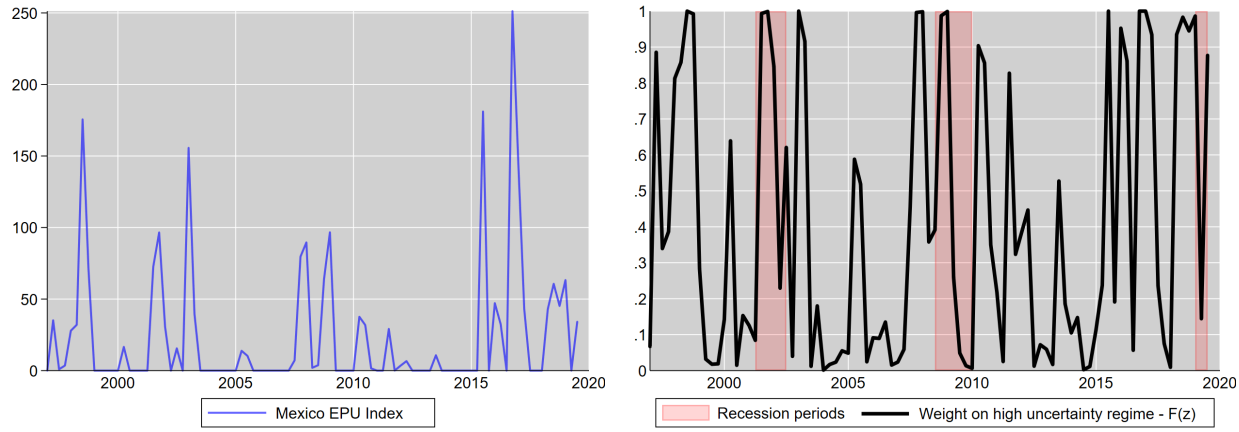


Figure 3: Left-hand panel: Mexico EPU Index represented as $max\ \{0, \frac{MexicoEPU_t - MexicoEPU_{t-4}}{MexicoEPU_{t-4}}\}$. Units are in percentage changes. Source: Baker, Bloom and Davis (2016). Righ-hand panel: Weight on high uncertainty regime $F(z)$, using the Mexico EPU Index. Shaded areas indicate the duration of the recessions according to the Mexican output gap. This gap is estimated using the Hodrick-Prescott filter with tail corrections (Antón, A. (2009)). Units indicate probabilities.

the p-value from the test difference across regimes. I find statistical differences on fiscal multiplier values, suggesting a non-linear behaviour of the output responses to fiscal policy regarding EPU, particularly in the long run (Table 1). The instrument relevance of the Blanchard and Perotti shock for these estimations holds for the entire horizon for the high-uncertainty episodes but only up to six quarters during regular times. Since the fiscal shock could be anticipated/announced, it could present higher correlation with the expectation channel, generating significant reactions on the private sector expectations.[16]

3.2.2 Public investment multipliers

Macroeconomic theory argues that public investment could boost economies through the stimulus on private demand and capital infrastructure; however, little is known about the conditions that could modify the public investment multiplier. Izquierdo et al. (2019) find that the lower (higher) the initial stock of public capital, the higher (lower) the public investment multipliers—suggesting that public investment in developing countries would carry high returns. On the other hand, IMF (2020) found that the public investment multiplier is around 2.6 during high uncertainty episodes but -0.3 during low uncertainty times, providing first evidence of the non-linear effects public investment could have conditional on uncertainty regimes for AEs.

I find evidence that, for the EMEs case, public investment multipliers also drop during a high uncertainty regime, particularly in the long run (Figure 4, right-hand panel). During high uncertainty times, the fiscal multiplier decreases and becomes negative with values around -2.5 and -3.0 over a three-year horizon. On the other hand, during regular episodes public investment multiplier is positive on the entire horizon. However, the estimates on this regime remain staistically indis-

[16]See Appendix A to consult the instrument relevance from each estimation.

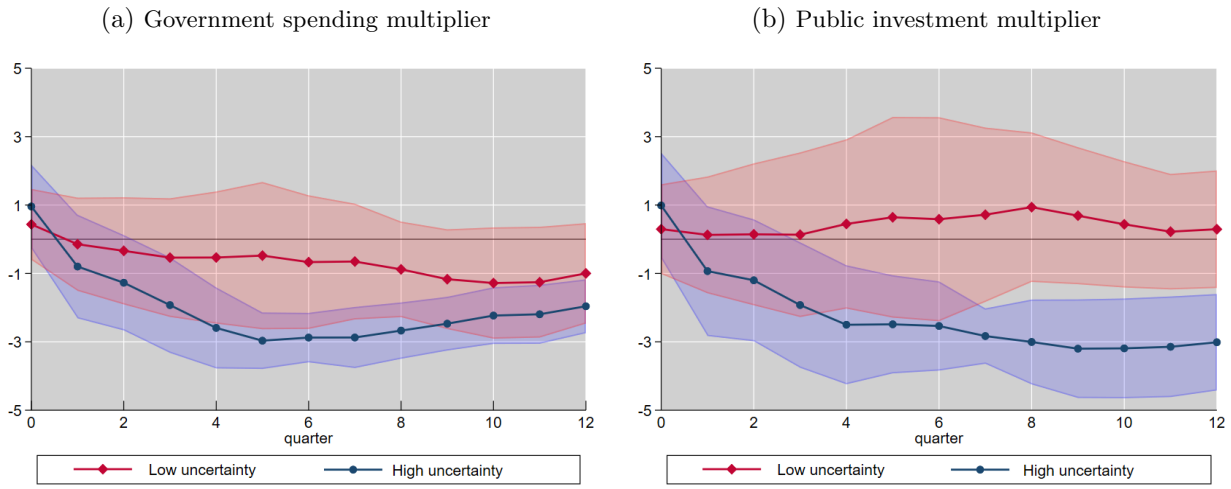


Figure 4: Government spending multiplier (left-hand panel) and public investment multiplier (right-hand panel) during high and low episodes of uncertainty using the Mexico EPU Index. Confidence intervals at 90 percent. Units are in MXN currency.

tinguishable from zero. The relevance of the Blanchard and Perotti shocks to public investment holds for almost entire horizon, showing that the Blanchard and Perotti shock is also a plausible candidate to estimate public investment multipliers. Finally, I also find statistical evidence of the differences on fiscal policy effects generated by the levels of economic policy uncertainty in the economy (Table 1).

3.3 US economic policy uncertainty as regimes for the Mexican case

Even when the Mexican EPU Index captures relevant external EPU episodes considered exogenous to local government spending, it also captures domestic EPU episodes, leaving room for an endogeneity bias if domestic EPU levels are affected by government spending. To address this issue, I use the US EPU Index to create EPU regimes as a robustness check. The US EPU Index only considers EPU episodes that are exogenous to the Mexican economy. That way, I reduce potential endogeneity bias to estimate state-dependent fiscal multipliers in high and low US uncertainty regimes for the Mexican economy. If multipliers in both regimes using the US EPU index are relatively close to those estimated considering the Mexico EPU Index, this latter would be enough exogenous to domestic fiscal policy.

I use the US EPU Index proposed by Baker, Bloom and Davis (2016), which is a natural candidate for a robustness check for the Mexican economy. First, given its nature, the US EPU Index is exogenous to Mexican public spending. Second, given the strong trade and political linkages between these countries, it has a large exposure to EPU from the US and both indices remained highly correlated (see Figure 5). Similarly to the previous subsection, I show the regime transition function F(z) estimated with equation (3) using the US EPU Index (Figure 6). As it happened with the Mexico EPU Index, the US Index generates uncertainty regimes that does not necessarily match with recession periods.[17]

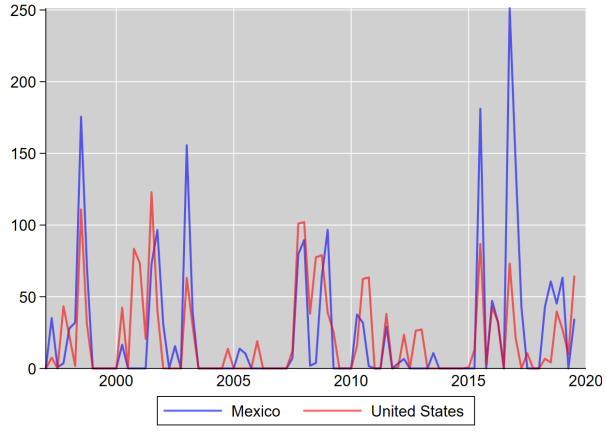
[17] $\gamma = 4.5$.

Table 1: Fiscal multipliers using the Mexico EPU Index

Government spending multipliers			
	Low uncertainty	High uncertainty	p-value
On impact	0.43	0.96	0.68
	(0.63)	(0.74)	
4 quarter	-0.53	-2.59**	0.06
	(1.17)	(0.72)	
8 quarter	-0.88	-2.67***	0.00
	(0.85)	(0.50)	
12 quarter	-1.0	-1.96**	0.00
	(0.89)	(0.48)	
Public investment multipliers			
	Low uncertainty	High uncertainty	p-value
On impact	0.30	0.99	0.63
	(0.79)	(0.94)	
4 quarter	0.45	-2.50**	0.07
	(1.50)	(1.06)	
8 quarter	0.94	-3.0***	0.01
	(1.33)	(0.75)	
12 quarter	0.29	-3.01***	0.00
	(1.04)	(0.85)	

Note: p-value reports the test for difference in multipliers across regimes, based on HAC robust standard errors. *** 99%, ** 95%, * 90%.

(a) Economic policy uncertainty Index



(b) Correlation = 0.69

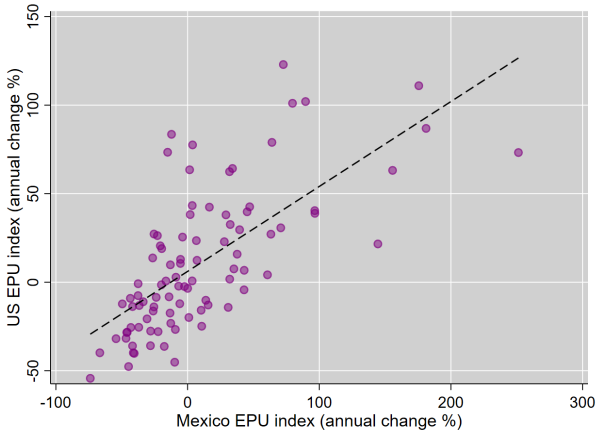


Figure 5: Left-hand panel: Mexico and US EPU Index represented as $max\ \{0, \frac{EPU_t - EPU_{t-4}}{EPU_{t-4}}\}$. Units are in percentage changes. Source: Baker, Bloom and Davis (2016). Right-hand panel shows the correlation within indexes. Source: Baker, Bloom and Davis (2016).

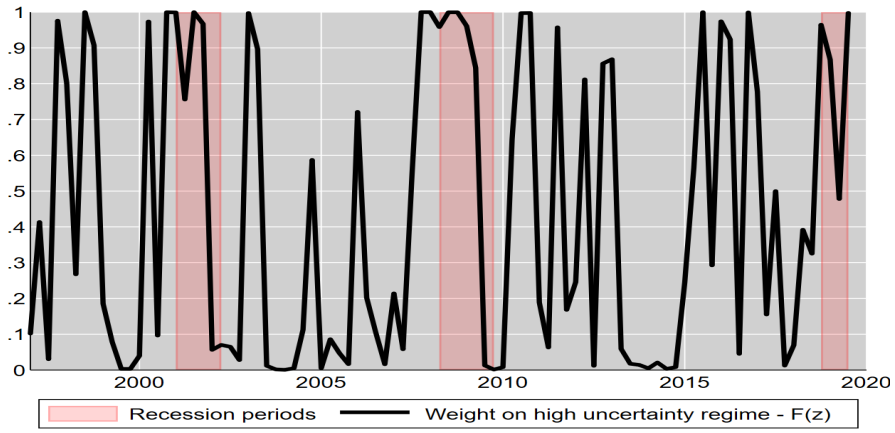


Figure 6: Weight on high uncertainty regime $F(z)$, using the US EPU Index. Shaded areas indicate the duration of the recessions according to the Mexican output gap. This gap is estimated using the Hodrick-Prescott filter with tail corrections (Antón, A. (2009)). Units indicate probabilities.

I find that fiscal multiplier dynamics remain for both government and public investment multipliers (Figure 7, left-hand panel). During high uncertainty episodes the fiscal multiplier is negative and takes values from -1.4 to -1.7 across the three-year horizon. In contrast, during normal times the fiscal multiplier is not statistically different from zero. Regarding the test to prove variation across states, p-value shows that the US EPU Index generates statistical differences on the output responses to fiscal policy (Table 2). The robustness check shows that the negative fiscal policy contribution to the economy remains through high uncertainty times, strengthening the initial hypothesis of this paper.

(a) Government spending multiplier

(b) Public investment multiplier

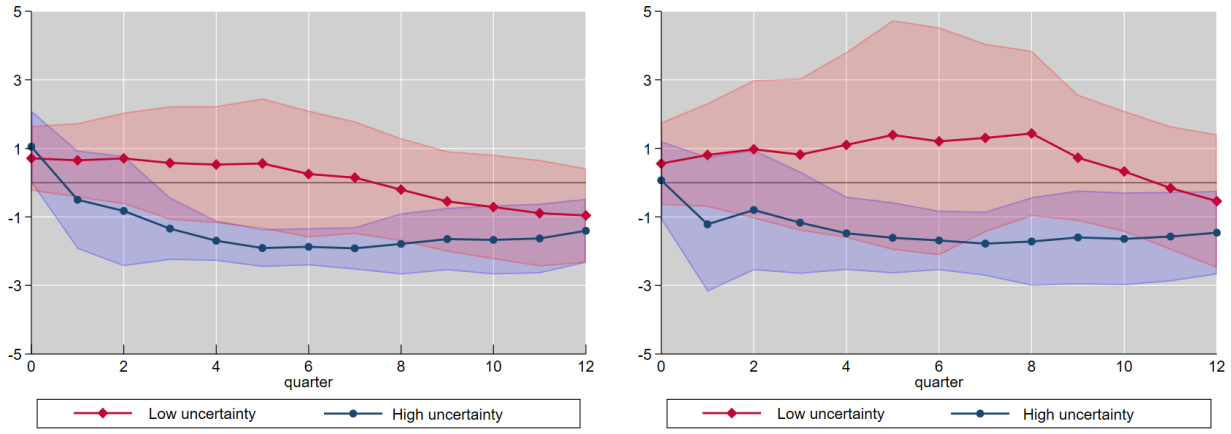


Figure 7: Government spending multiplier (left-hand panel) and public investment multiplier (right-hand panel) during high and low episodes of uncertainty using the US EPU Index. Confidence intervals at 90 percent. Units are in MXN currency.

Looking into the public investment multipliers by using the US EPU Index as a threshold, I find that the multiplier dynamics remain similar with those estimated with the Mexico EPU Index

(Figure 7, right-hand panel). During high uncertainty times, the fiscal multiplier is negative and statistically signficant across the entire horizon with values from -1.5 to -1.7. During regular times, multipliers are positive but not statistically different from zero. After a year, statistical differences across states surge, indicating medium term differences in public multipliers across EPU conditions related to the US. Regarding the instrument relevance to fiscal shocks under the US EPU Index as a threshold, it remains stable and significant throughout the study horizon (Table 2).[18] Despite the similarities in the multipliers' dynamics, fiscal multipliers using the Mexico EPU Index are consistently more negative than their peers using the US EPU Index. This fact could be explained due to the Mexico EPU Index better captures the impact of spillovers from external uncertainty conditions by better weighing how spillovers are affected in local firms.

Summarising these sections' main findings, I find statistical evidence that the levels of economic policy uncertainty blunt the effectiveness of fiscal policy in EMEs. During high uncertainty levels, the fiscal multiplier considerably drops two units on average, mainly in the long term. Hence, fiscal expansion will likely become a *contractionary-fiscal expansion* if economic policy uncertainty rises.[19]

Table 2: Fiscal multipliers using the US EPU Index

Government spending multiplier			
	Low uncertainty	High uncertainty	*p*-value
On impact	0.71	1.05	0.70
	(0.58)	(0.64)	
4 quarter	0.52	-1.69***	0.01
	(1.04)	(0.36)	
8 quarter	-0.20	-1.79***	0.00
	(0.91)	(0.54)	
12 quarter	-0.96	-1.40**	0.02
	(0.84)	(0.56)	
Public investment multiplier			
	Low uncertainty	High uncertainty	*p*-value
On impact	0.55	0.07	0.65
	(0.73)	(0.70)	
4 quarter	1.10	-1.48**	0.18
	(1.65)	(0.65)	
8 quarter	1.43	-1.72**	0.06
	(1.46)	(0.78)	
12 quarter	-0.54	-1.46**	0.45
	(1.18)	(0.74)	

Note: *p*-value reports the test for difference in multipliers across regimes, based on HAC robust standard errors. *** 99%, ** 95%, * 90%.

[18] Consult Appendix A to see the instrument relevance estimated.

[19] This concept is explained by Giavazzi and Pagano (1990). They study how fiscal consolidation can change the future expectations of taxes and government spending in conditions with high debt levels, reducing the risk of default and macroeconomic instability and stimulating private spending. In this case, a continuous fiscal expansion amid high economic policy uncertainty could raise default risks, tighten the channel expectation of tax announcements, and raise concerns over future tax increases, further contracting the economy.

4 Analysing the demand side drivers

To see what demand component drives the difference in fiscal stimulus from the demand side, I decompose the fiscal multiplier into the effects on private investment and consumption. This last section examines the state-dependent fiscal multiplier on private investment and consumption in high and low uncertainty regimes. The initial hypothesis is that differences in the effectiveness of fiscal policy under uncertainty episodes are explained by the crowding out effect and the precautionary behaviour of the private sector. Estimations confirm that such effects explain the differences across states, focusing on a private investment displacement. Private consumption seems to show mixed evidence.

4.1 Private investment multipliers

To compute fiscal multipliers for the demand components, I used the same methodology mentioned in Section 1. I also added two lags of the GDP component of interest to the standard controls vector, which was previously defined in section 1.

Regarding the private investment responses to fiscal policy, they seem to react to the levels of economic policy uncertainty (Figure 8, left-hand panel).[20] Government spending multiplier is negative and statistically different from zero under high-uncertainty times—reaching values of -3.0 after three years. This difference is also observed with the public investment multiplier but in a lower magnitude. Hence, a stronger crowding out effect on private investment is detected, suggesting a precautionary behaviour from firms.[21]

Results on how private investment responds to fiscal policy during high and low uncertainty regimes are consistent with recent literature. Banco de México (2020) shows that uncertainty innovations generate a cumulative reduction of -4.9% on private investment over a one-year horizon and a reduction of -3.0% on private consumption.

4.2 Private consumption multipliers

The fiscal policy effects on private consumption seem to behave independently of the levels of uncertainty in the economy when Mexico EPU Index is used (Figure 8, right-hand panel). I find negative fiscal multipliers over the 3-year horizon on both approaches. The consumption responses to fiscal policy do not show statistical differences across the uncertainty regimes, indicating no difference in responses to fiscal policy (Table B2). However, there is mixed evidence of the consumption responses to fiscal policy when public investment and the US EPU Index are used, leaving few evidence of its dynamics. These results suggest that consumption responses to fiscal policy do not clearly seem to be affected by the levels of economic policy uncertainty. However, differences in consumption responses could obey other economic conditions.[22]

[20] The remainder of the fiscal multiplier dynamics from private investment and consumption are computed in Appendix B.

[21] Consult Table B1 to see fiscal multiplier values on private investment. For completeness purposes, state-dependent multipliers were computed using the US EPU Index as a threshold to gain robust evidence of the crowding out effect. The negative contribution of fiscal expansions holds but with few differences (Table B1).

[22] Ramey (2019) mentions the theoretical conditions that could also define fiscal policy effects on private consumption. The proportion of Ricardian and hand-to-mouth consumers and the anticipation of fiscal shocks could modify

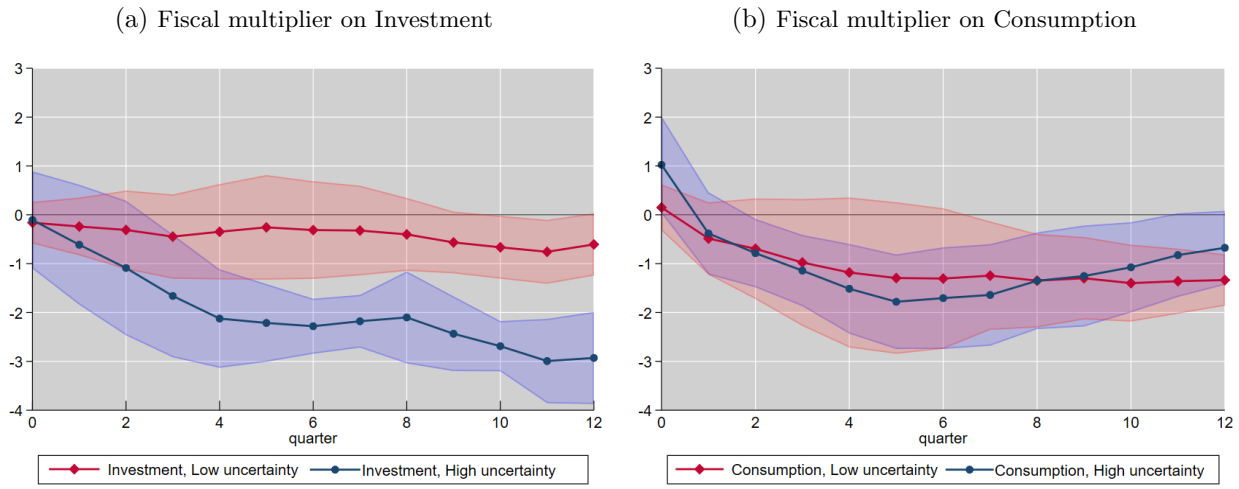


Figure 8: Government spending multiplier on private investment (left-hand panel) and consumption (right-hand panel) during high and low episodes of uncertainty using the Mexico EPU Index. Confidence intervals at 90 percent. Units are in MXN currency.

This final section aimed to look at the impact of fiscal policy on GDP components and confirm that crowding out effect explains the differences in the fiscal multipliers. The growing literature on the relationship between uncertainty and macroeconomic effects could confirm this mechanism. Barrero, Bloom and Wright (2018) mention how private investment is directly affected by uncertainty shocks in the short and long run, supporting the hypothesis of a higher private investment displacement during a high uncertainty regime.

Conclusions

This paper studies whether economic policy uncertainty levels modify fiscal policy effectiveness by looking at the output responses to fiscal shocks in high and low economic policy uncertainty regimes. I use local projections to estimate state-dependent fiscal multipliers during regular versus high uncertainty times for the case of Mexico, contributing to the literature on fiscal multipliers conditional on uncertainty conditions by showing first evidence for the case of EMEs.

I find empirical evidence that shows non-linear output responses to fiscal policy conditional to the levels of EPU, suggesting that policymakers should also consider uncertainty levels in the design of a optimal fiscal policy. On average, I find that the fiscal multiplier during high uncertainty episodes diminish two units relative to a low uncertainty regime. statistical tests of differences across multiplier's values indicates that this effect is stronger in the long term. These results suggest that, in contrast to AEs where multipliers are higher during high uncertainty periods, they are lower for the case of EMEs. A possible explanation of this difference is the lack of tolerance from the private sector to instability periods in EMEs due to the fresh memory of high debt and hyperinflation episodes, particularly for Latin American economies (Reinhart, Rogoff, and Savas-

the consumption response to fiscal shocks.

tano (2003)). Finally, I find that private investment responses drive these effects, strengthening the crowding out channel.

These results can be interpreted as an initial stage for state-dependent fiscal multipliers related to EPU in EMEs. Future works could extend these views in a panel approach for a large set of EMEs. Finally, as much as the fiscal multiplier explains expansionary fiscal policies, this work could provide evidence on fiscal consolidation effects based upon deficits cuts under high and low EPU regimes, as mentioned by Alesina et al. (2018).

References

[1] Alesina, Alberto, Gualtiero Azzalini, Carlo Favero, Francesco Giavazzi, and Armando Miano, 2018. "Is It the 'How' or the 'When' That Matters in Fiscal Adjustments?", IMF Economic Review 66 (1): 144–88.

[2] Antón, Arturo, 2010. "El problema al final de la muestra en la estimación de la brecha del producto", Economía mexicana, Nueva época, 19(1), 5-30.

[3] Auerbach, Alan J., and Yuriy Gorodnichenko, 2012a. "Fiscal Multipliers in Recession and Expansion", Fiscal Policy after the Financial Crisis, February, 63–98.

[4] ———, 2012b. "Measuring the Output Responses to Fiscal Policy", American Economic Journal: Economic Policy 4 (2): 1–27.

[5] Baker, Scott R., Nicholas Bloom, and Steven J. Davis, 2016. "Measuring Economic Policy Uncertainty", The Quarterly Journal of Economics 131 (4): 1593–1636.

[6] Banco de México, 2020. "El Impacto de la Incertidumbre sobre el Consumo y la Inversión en México", extract of Inflation Report, October - December 2019, Box 2, pp. 22-25, February 2020.

[7] Banerjee, Ryan and Fabrizio Zampolli, 2019. "What drives the short-run costs of fiscal consolidation? Evidence from OECD countries". Economic Modelling, Volume 82, 2019, Pages 420-436, ISSN 0264-9993.

[8] Barrero, Jose Maria, Nicholas Bloom, and Ian Wright, 2018. "Short and Long Run Uncertainty", Working paper.

[9] Berg, Tim O, 2019. "Business Uncertainty and the Effectiveness of Fiscal Policy in Germany", Macroeconomic Dynamics 23 (4): 1442-70.

[10] Blanchard, Olivier, and Roberto Perotti, 2002. "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output", The Quarterly Journal of Economics 117 (4): 1329–68.

[11] Carrière-Swallow, Yan, and Luis Felipe Céspedes. 2013. "The Impact of Uncertainty Shocks in Emerging Economies." Journal of International Economics 90 (2): 316–25.

[12] Contreras, Juan, and Holly Battelle, 2014. "Fiscal Multipliers in a Panel of Countries", SSRN Scholarly Paper ID 2473167. Rochester, NY: Social Science Research Network.

[13] Giavazzi, Francesco, and Marco Pagano, 1990. "Can Severe Fiscal Contractions Be Expansionary? Tales of Two Small European Countries", NBER Macroeconomics Annual 5 (January): 75–111.

[14] Gordon, Robert J, and Robert Krenn, 2010. "The End of the Great Depression 1939-41: Policy Contributions and Fiscal Multipliers", Working Paper 16380. Working Paper Series. National Bureau of Economic Research

[15] Ilzetzki, Ethan, Enrique G. Mendoza, and Carlos A. Végh, 2013. "How Big (Small?) Are Fiscal Multipliers?", Journal of Monetary Economics 60 (2): 239–54.

[16] International Monetary Fund, 2018. "Fiscal Multipliers: How Will Consolidation Affect Latin America and the Caribbean?", Regional Economic Outlook, April 2018, Western Hemisphere Department : Seizing the Momentum.

[17] ———, 2020. "October Fiscal Monitor: Policies for the Recovery", Chapter 2: Public investment for the recovery.

[18] Izquierdo, Alejandro, Juan Pablo Medina, Ruy E. Lama, Jorge P. Puig, Daniel Riera-Crichton, Carlos A. Vegh, and Guillermo Vuletin, 2019. "Is the public investment multiplier higher in developing countries? An empirical investigation", National Bureau of Economic Research Working Paper Series, No. 26478, 2019.

[19] Jordà, Òscar, 2005. "Estimation and Inference of Impulse Responses by Local Projections", American Economic Review 95 (1): 161–82.

[20] Miyamoto, Wataru, Thuy Lan Nguyen, and Dmitriy Sergeyev, 2018. "Government Spending Multipliers under the Zero Lower Bound: Evidence from Japan", American Economic Journal: Macroeconomics 10 (3): 247–77.

[21] Newey, Whitney K., and Kenneth D. West, 1987. "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix." Econometrica 55 (3): 703–8.

[22] Olea, José Luis Montiel, and Carolin Pflueger, 2013. "A Robust Test for Weak Instruments", Journal of Business & Economic Statistics 31 (3): 358–69.

[23] Ramey, Valerie, 2016. "Chapter 2 - Macroeconomic shocks and their propagation", Handbook of Macroeconomics Volume 2, 2016, pages 71-162.

[24] ———, 2019. "Ten Years after the Financial Crisis: What Have We Learned from the Renaissance in Fiscal Research?", Journal of Economic Perspectives 33 (2): 89–114.

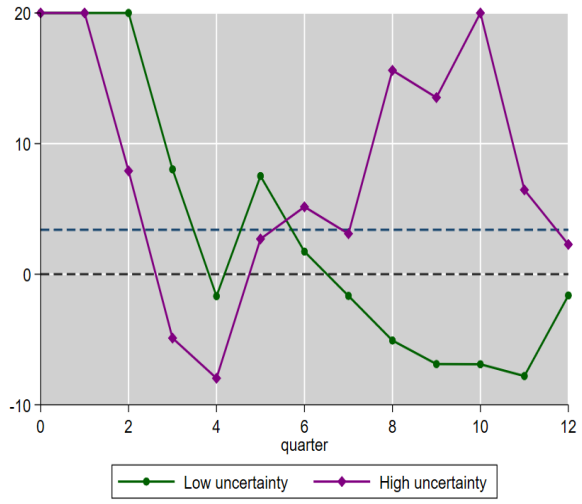
[25] Ramey, Valerie A., and Sarah Zubairy, 2018. "Government Spending Multipliers in Good Times and in Bad: Evidence from US Historical Data", Journal of Political Economy 126 (2): 850–901.

[26] Reinhart, Carmen M, Kenneth S Rogoff, and Miguel A Savastano, 2003. "Debt Intolerance", Working Paper 9908. Working Paper Series. National Bureau of Economic Research.

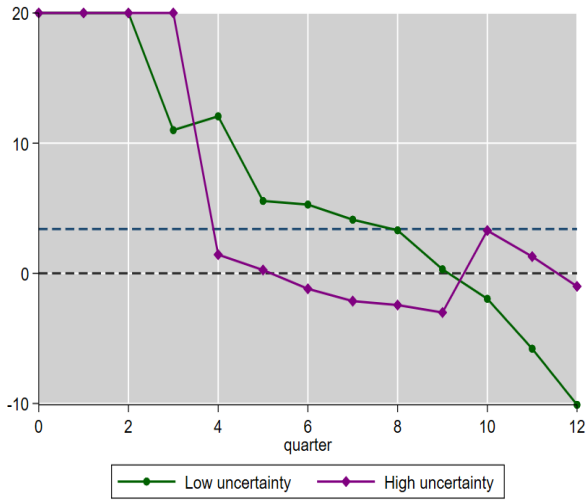
Appendix A Instrument relevance of the Blanchard and Perotti shock

This appendix shows the instrument relevance of the fiscal shock used to estimate multipliers. The Blanchard and Perotti shock g (from equations (2)) is used as an instrument in equation (2) to compute state-dependent fiscal multipliers. I used the Olea and Pflueger (2013) effective F-statistics for weak instruments, where thresholds can be higher due to serial correlations on errors.

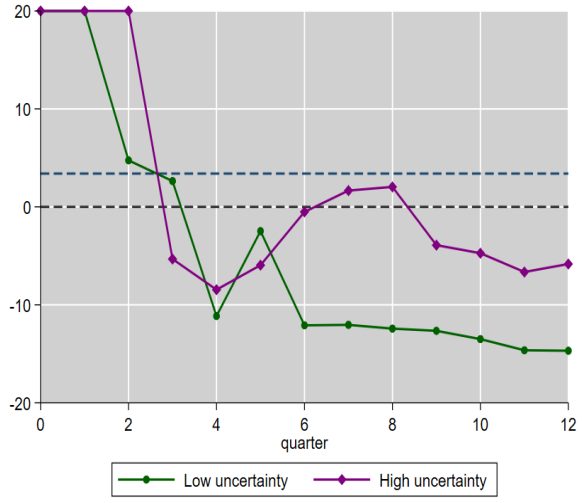
(a) Gov spending & Mexico EPU Index



(b) Pub inv & Mexico EPU Index



(c) Gov spending & US EPU Index



(d) Pub inv & US EPU Index

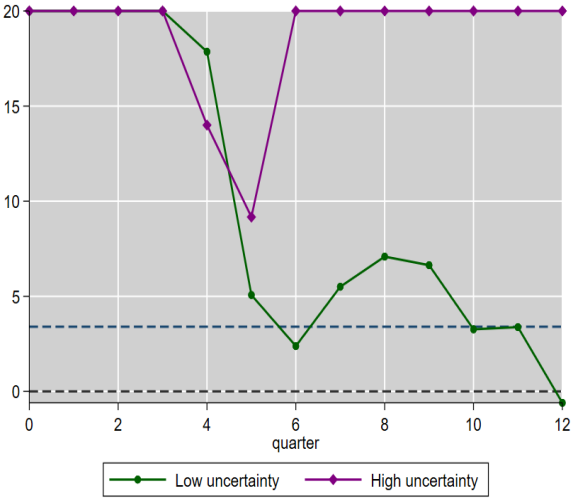


Figure A1: F-statistics reported, capped at 20. The clear-blue-dashed line represents the threshold for 10 per cent critical values. The dark-blue-dashed line represents the threshold for 5 per cent critical values.

Figure A1 shows the difference between the first-stage effective F-statistics and the threshold to 5 and 10 per cent critical values from Olea and Pflueger (2013) for every horizon in the four regimes

constructed.[23] A value above zero (above the clear-blue-dashed line) means that F-statistics are above the 10 per cent critical value threshold. Values above 3.4 (above the dark-blue-dashed line) mean that F-statistics are above the threshold for 5 per cent critical values. The first-stage regression includes two lags of the standard controls mentioned before. Therefore, all statistics are robust to heteroscedasticity and serial correlation.

In both states of the economy, the estimated shocks are highly relevant at entire horizons for almost all shocks. However, there are mixed dynamics in the F-values from each state. Subfigures A1.a and A1.b show that relevance from fiscal shock is around the entire horizon when I use the Mexico EPU Index. When I use the US Mexico Index, relevance for public investment is above all quarters (Figure A1.d), but government spending relevance reduces to 4 quarters (Figure A1.c). Overall, using the EPU Indexes based on Baker, Bloom and Davis (2016) to construct uncertainty regimes show higher relevance for the Blanchard and Perotti shock identification.

This instrument's relevance is consistent with Ramey and Zubairy (2018) for the US economy study and the Japanese economy studied by Miyamoto, Nguyen, and Sergeyev (2018). These studies analyse the state-dependent fiscal multipliers over the business-cycle position and find that the shocks obtained from the Blanchard and Perotti (2002) identification have lower F-statistics at longer horizons but higher values at short horizons.

[23] I use the threshold for the 5 and 10 per cent critical values for testing the null hypothesis that the two-stage least squares bias exceeds 10 per cent of the ordinary OLS bias. For one instrument, the thresholds are 23.1 and 19.7, respectively.

Appendix B Fiscal multipliers on private investment and consumption

B.1 Tables

Table B1: Fiscal multipliers on private investment

Mexico EPU Index						
	Government spending multiplier			**Public investment multiplier**		
	Low uncertainty	High uncertainty	p-value	Low uncertainty	High uncertainty	p-value
On impact	-0.16	-0.10	0.91	-0.34	-0.50	0.84
	(0.26)	(0.60)		(0.43)	(0.65)	
4 quarter	-0.35	-2.12***	0.04	-0.46	-1.52***	0.28
	(0.59)	(0.61)		(0.94)	(0.45)	
8 quarter	-0.40	-2.10***	0.00	0.24	-0.71	0.54
	(0.45)	(0.57)		(0.90)	(0.69)	
12 quarter	-0.60	-2.93**	0.00	0.07	-1.29***	0.30
	(0.38)	(0.57)		(0.69)	(0.45)	
US EPU Index						
	Government spending multiplier			**Public investment multiplier**		
	Low uncertainty	High uncertainty	p-value	Low uncertainty	High uncertainty	p-value
On impact	-0.05	0.08	0.78	-0.26	-0.94**	0.26
	(0.39)	(0.39)		(0.50)	(0.40)	
4 quarter	0.42	-0.59	0.19	-0.19	-0.89**	0.62
	(0.80)	(0.40)		(1.31)	(0.37)	
8 quarter	0.04	-0.56	0.37	1.44	-0.39	0.29
	(0.64)	(0.38)		(1.57)	(0.48)	
12 quarter	-0.51	-1.02**	0.07	-0.23	-0.58	0.68
	(0.42)	(0.42)		(0.94)	(0.49)	

Note: p-value reports the test for difference in multipliers across regimes, based on HAC robust standard errors. *** 99%, ** 95%, * 90%.

Table B2: Fiscal multipliers on private consumption

Mexico EPU Index						
	Government spending multiplier			**Public investment multiplier**		
	Low uncertainty	High uncertainty	p-value	Low uncertainty	High uncertainty	p-value
On impact	0.15	1.02*	0.21	-0.24	1.00	0.29
	(0.29)	(0.60)		(0.59)	(0.87)	
4 quarter	-1.18	-1.51***	0.99	-0.34	-1.11	0.61
	(0.93)	(0.55)		(0.75)	(0.69)	
8 quarter	-1.34**	-1.35**	0.71	-1.36	-2.65***	0.77
	(0.58)	(0.60)		(1.15)	(0.33)	
12 quarter	-1.33***	-0.67	0.00	-1.57***	-3.18***	0.39
	(0.32)	(0.46)		(0.51)	(0.59)	
US EPU Index						
	Government spending multiplier			**Public investment multiplier**		
	Low uncertainty	High uncertainty	p-value	Low uncertainty	High uncertainty	p-value
On impact	-0.04	1.46***	0.02	-0.67	1.13*	0.07
	(0.36)	(0.44)		(0.55)	(0.65)	
4 quarter	0.45	-1.03***	0.14	0.43	-1.08**	0.19
	(0.65)	(0.18)		(0.63)	(0.53)	
8 quarter	-0.08	-1.35***	0.25	-0.25	-1.93***	0.28
	(0.71)	(0.47)		(0.86)	(0.32)	
12 quarter	-0.24	-0.76*	0.14	-0.61	-1.67***	0.17
	(0.53)	(0.43)		(0.53)	(0.43)	

Note: p-value reports the test for difference in multipliers across regimes, based on HAC robust standard errors. *** 99%, ** 95%, * 90%.

B.2 Graphs

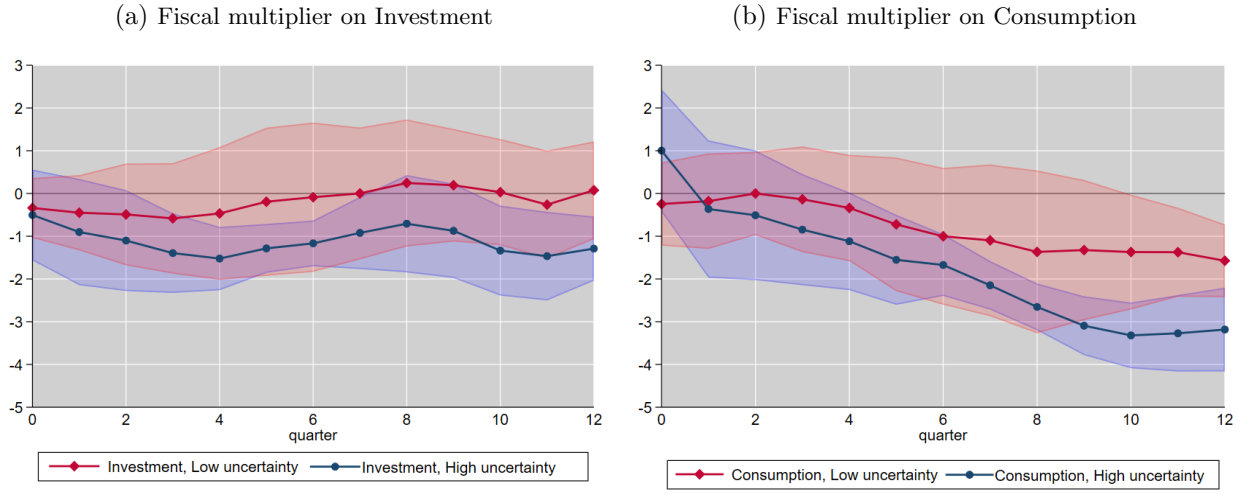


Figure B1: Public investment multiplier on private investment (left-hand panel) and consumption (right-hand panel) during high and low episodes of uncertainty using the Mexico EPU Index. Confidence intervals at 90 percent. Units are in MXN currency.

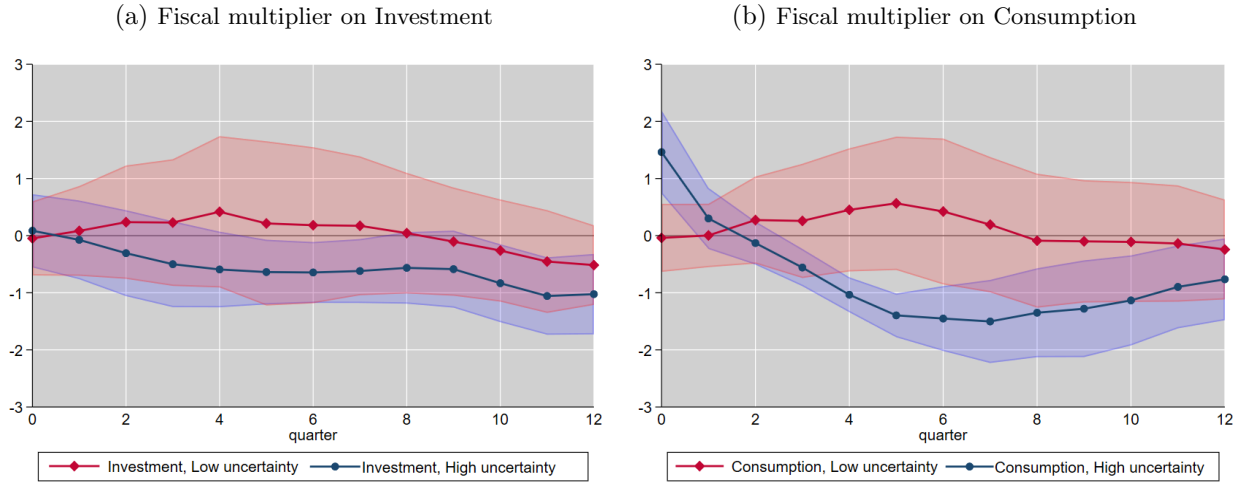


Figure B2: Government spending multiplier on private investment (left-hand panel) and consumption (right-hand panel) during high and low episodes of uncertainty using the US EPU Index. Confidence intervals at 90 percent. Units are in MXN currency.

(a) Fiscal multiplier on Investment

(b) Fiscal multiplier on Consumption

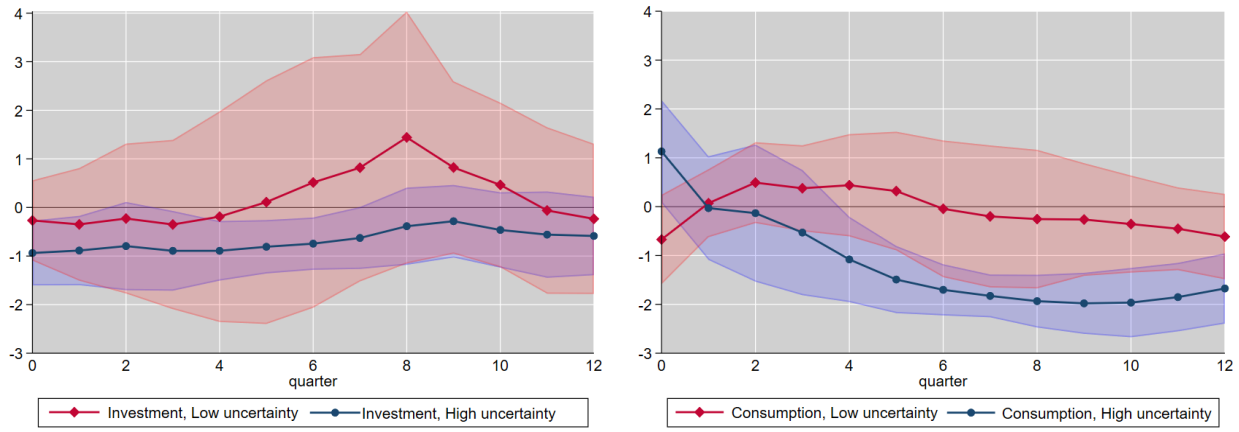


Figure B3: Public investment multiplier on private investment (left-hand panel) and consumption (right-hand panel) during high and low episodes of uncertainty using the US EPU Index. Confidence intervals at 90 percent. Units are in MXN currency.