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Fiscal space and economic recovery from the Covid-19 pandemic crisis in Mexico

Espacio fiscal y recuperación económica de la crisis producida en México por la pandemia de Covid-19

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Abstract

Given the crisis caused by the Covid-19 pandemic, it is necessary to determine if there is fiscal space to carry out an anti-cyclical policy in Mexico that in the short term will facilitate economic recovery. In this paper we seek to empirically approximate the existence of fiscal space by estimating the sustainability gap of the primary balance, making use of the forecasts of a cointegrated macroeconomic model. Specifically, the gap is estimated using the trend forecast of nominal GDP, the nominal interest rate, and the primary balance in the coming months. Our findings suggest that there is not enough fiscal space to implement an expansionary policy based on public debt over the next year, even though GDP growth will remain on a gradual recovery path and the interest rate could remain longer. lower than before the crisis. Thus, public spending must be managed efficiently to avoid a large increase in the deficit and greater risks to financial stability.

JEL Code: H12, H30, H62, H63, H68
Keywords: fiscal space; fiscal policy; debt sustainability; economic recovery; Covid-19

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Resumen

Dada la crisis por la pandemia de Covid-19, se requiere determinar si existe espacio fiscal para llevar a cabo una política anticíclica en México que en el corto plazo facilite la recuperación económica. En este artículo buscamos aproximar empíricamente la existencia de espacio fiscal mediante la estimación de la brecha de sostenibilidad del balance primario, haciendo uso de los pronósticos de un modelo macroeconómico cointegrado. Específicamente, se estima la brecha usando el pronóstico tendencial del PIB nominal, la tasa de interés nominal y el saldo primario en los próximos meses. Nuestros hallazgos sugieren que no hay espacio fiscal suficiente para implementar una política expansiva basada en deuda pública durante el próximo año, incluso a pesar de que el crecimiento del PIB se mantendrá en una ruta de recuperación gradual y de que la tasa de interés pudiera mantenerse más baja que antes de la crisis. Así, el gasto público deberá administrarse de manera eficiente para evitar un gran aumento en el déficit y mayores riesgos a la estabilidad financiera.

Código JEL: H12, H30, H62, H63, H68
Palabras clave: espacio fiscal; política fiscal; sostenibilidad de la deuda; recuperación económica; Covid-19

Introduction

The economic crisis associated with the health crisis and the massive lockdown has generated the need to increase government spending to reduce the decline in global production. Nonetheless, an increase in public debt could be perceived as unsustainable by financial markets and could trigger exchange rate and speculative crises in emerging countries. In Latin American countries, the sustainability of the deficit is a critical issue, as some countries have had high levels of debt since the 2008 crisis. This is the case with Argentina, whose currency plummeted in recent months due to the great uncertainty generated by its dollar-based debt (which represents around 98% of its 2019 GDP).

Before implementing an expansionary policy based on public debt, it must first be quantitatively determined whether there is fiscal space in the Mexican economy. Fiscal space is understood as the level of freedom that the fiscal authority has to expand its level of government spending while maintaining a sustainable deficit over time (Creel, 2020). It is well known that the sustainability of the public deficit depends on whether a country has the budget revenues to service its debt. Sustainability depends on GDP growth, the evolution of fiscal revenues, the exchange rate, and interest rates, assuming other factors are constant.

During the Covid-19 crisis, the Mexican government has faced strong pressures in several areas: a) to employ resources in the health sector, b) to implement strategies to reduce the economic impact among economic agents, and c) to maintain sound finances to avoid speculative attacks. Thus, in April 2020, the Mexican government announced a financial support package equivalent to 0.7% of GDP to address the Covid-19 pandemic. This slight increase in spending made it possible to stimulate the economy

without putting pressure on the fiscal deficit, with measures such as refunding Value Added Tax (VAT) and granting credits at low-interest rates and loans to SMEs. Transfers of social programs to vulnerable groups of the population were also brought forward and resources were freed up for spending on infrastructure, education, and security, among other measures. Apparently, this increase in government spending of less than one percentage point of GDP boosted private consumption, but it was not enough to cushion the 8.5% drop in GDP in 2020. This suggests that it will probably be necessary to increase government spending further by at least one or two percentage points of GDP in the coming months to stimulate the Mexican economy, but this will depend on the existence of fiscal space. Indeed, it will be necessary to reconsider how to implement a countercyclical policy without generating more public debt, adverse outcomes, and future financial crises. So far, the Mexican government has resorted to reallocating government spending rather than public debt. As a result, the country's credit rating has remained stable.

This paper used a cointegrated simultaneous equations econometric model to make projections of GDP, the primary balance, the interest rate, and other variables for 2021. These forecasts were used to calculate the sustainability gap of the primary balance in the short term. The guiding question is: Is there fiscal space for an expansionary policy based on an increase in public debt in the current pandemic situation? In this context, it is hypothesized that there is currently no fiscal space in the Mexican economy since debt as a proportion of GDP grew significantly in recent years, going from 33.8% of GDP in 2011 to 46% in 2018. Furthermore, with the health crisis, this fiscal space will have a further reduction as a result of the severe deterioration of economic growth and the exchange rate. This phenomenon will increase debt as a proportion of GDP in an accelerated manner in the coming months, possibly reaching a value of 70% of GDP.

The empirical findings suggest that even if the public sector continued with the current strategy of keeping its debt level low in 2021, the fiscal deficit could face problems in sustaining itself because there is no fiscal space. Debt as a percentage of GDP is already in an unsustainable range and may continue to increase due to external factors such as the exchange rate. Furthermore, it is difficult to get into debt without generating uncertainty and possible speculative attacks. This leads to the conclusion that it is best for Mexico to maintain a balance between achieving a controlled deficit and increasing government spending on productive public investment without generating more debt.

This article is structured as follows: the second section presents a brief review of relevant literature. The third section discusses stylized facts about the variables associated with fiscal space. In the fourth section, the methodology for projecting the fiscal space variables for 2020 and 2021 is presented. The fifth section develops the empirical analysis of fiscal space in the context of the current economic crisis. The last section presents some conclusions.

Review of the literature

Fiscal space is conceptually defined as: "the room for maneuver that exists within the public budget to provide resources without compromising financial sustainability or economic stability" (Heller, 2005); "the level to which a country has the capacity to finance a fiscal stimulus without a substantial increase in the real interest rate" (Aizenman & Jinjarak, 2011); "the difference between the country's current debt level and its debt limit, where the latter is the level beyond which insolvency occurs" (Ghosh et al., 2013).

Fiscal space is a recurrent issue in times of economic crisis, such as the one experienced in 2020. As mentioned by Metelli and Pallara (2020), a fiscal policy comes into force and is implemented through discretionary measures with the aim of generating positive effects on economic performance. However, according to the authors, the result will depend on the multiplier effect generated, which will be determined by the fiscal space. A wide fiscal space results in a multiplier higher than 1, while a reduced fiscal space offers a multiplier lower than 1. The evidence is found in this study carried out for the U.S. economy from 1929 to 2015.

Fiscal space is related to the economic cycle, given that in booms it is expected to expand, and in recessions it goes in the opposite direction. At least that should happen when a countercyclical fiscal policy is present (Popovski, 2019). During the first decade of the century in the Latin American region, fiscal policy was in some cases less procyclical and in others decidedly countercyclical (Machinea et al., 2012; Celasun et al., 2015). With the rapid growth of commodity prices and institutional improvements, the fiscal space was widened, which was used to face the economic consequences of the 2008 financial crisis.

After that crisis and in the face of the fall in commodity prices in 2014, different analyses pointed to the deterioration of the fiscal situation and the increase in indebtedness (Lozano-Espitia & Julio-Román, 2019), which suggested the recovery of fiscal space in a scenario complicated by the downward trend in economic growth. According to Kose et al. (2017), fiscal space had improved in many countries until before the financial crisis. Subsequently, two results could be observed: in advanced economies, it returned to a situation similar to that of the beginning of the century, while in developing economies, it was even reduced.

There is general agreement on how to create fiscal space. This can be by improving government spending, increasing taxes, or increasing donations. This should preferably be achieved without losing monetary stability and fiscal sustainability (Heller, 2005).

On the spending side, priority should be given to productive spending, which implies reducing unproductive spending, promoting efficiency in spending programs, reducing corruption, and improving resource management. Villareal and Villa (2021) propose a new measurement of fiscal space where

unavoidable public spending is identified, which can generate fiscal space in the short and medium term by restructuring the budget.

On the revenue side, the tax base should be broadened, and a progressive increase in indebtedness should be avoided. In this case, it is recommended not to make use of monetary expansion due to the effects it might have on inflation.

Self-financing is critical in the discussion since it is one of the limitations in developing countries. In this regard, different proposals have been made to expand fiscal space through the establishment of partial tax changes, as proposed by Davies et al. (2016), by establishing an income tax on medium and large agricultural producers in Pakistan, or tax reforms, as proposed by Gnangnon and Brun (2020). The latter analyzed 99 developing countries between 1980 and 2015 and suggested that tax reforms contribute significantly to the expansion of fiscal space in developing countries. Lunina et al. (2020) state that in transitional economies such as Ukraine, reforms should consider the particular effects that government actions may have on the sustainability of the economy. Likewise, Yohou (2020) explains that developing countries that benefit most from this reform are those able to make progress in the fight against corruption.

Faced with the dilemma of reducing spending or seeking financing alternatives, Ortiz et al. (2017) favor the latter in order to maintain spending on social protection. In addition to increasing tax revenues, development aid through transfers and grants, and reallocation of spending, they also emphasize the adoption of a more flexible macroeconomic framework and the use of fiscal reserves and foreign currency.

For the fiscal space, it is important to consider the interaction between the central bank and the government to alleviate the burden of fiscal policy and make it viable (Creel, 2020). Likewise, it is necessary to establish that the limits on debt levels depend on the level of revenue available since 60% of debt in relation to GDP offers ample fiscal space for countries with revenue of around 50% of their GDP and limited space for countries with revenue below 25% (Aizenman & Jinjarak, 2011). It is also necessary to bear in mind that the relation between fiscal space and debt can be non-linear and establish different parameters depending on the type of economy in question. In a study by Ghosh et al. (2013) for 23 advanced economies, the relation is positive for moderate debt levels but declines when debt reaches 90 to 100% of GDP.

Lozano-Espitia and Julio-Román (2010) calculated the fiscal space of 13 countries, among them Colombia, Chile, Mexico, and Ecuador. The debt limit was estimated at 55.6%, 69.0%, 59.5%, and 46.4% of their GDP, respectively, which offered them a fiscal space of 6.2%, 45.5%, 5.4%, and 1.5% in relation to their GDP. According to these authors, Chile's ample fiscal space is due to its low level of indebtedness and its good macroeconomic performance. For their part, Romer and Romer (2019), studying 30 countries

in the period 1980-2017, find that relative debt levels are important in establishing a response to crises. Consequently, they establish that under normal conditions, fiscal policy should maintain low debt levels and in conditions of financial difficulties, the burden of this debt should not unnecessarily drive the fiscal response. Using a VAR Abdul (2016) finds that fiscal space has positive effects on the growth rate in Egypt.

Stylized facts on fiscal space in Mexico in the context of the Covid-19 crisis

The existence of fiscal space depends on how sustainable the debt is, which is expressed by the government's budget constraint. Consequently, fiscal space is inextricably associated with a country's debt in domestic and foreign currency, economic growth, and interest rate. The stylized facts in Figure 1 suggest a large increase in accumulated public indebtedness as a percentage of GDP in recent years in Mexico. This increasing indebtedness occurred mainly after the 2008 crisis and was the result of expansionary fiscal policy for countercyclical purposes. The pace of debt growth stabilized in 2017, when the Mexican government began to aim for a primary surplus of one percentage point.

Thus, between 2018 and 2019, the debt did not grow significantly. However, during the 2020 COVID-19 pandemic, the amount of debt soared again. This time the indebtedness was not primarily the result of increased contracting of new debt for expansionary purposes but rather was attributable to the effect of the exchange rate depreciation on the large liabilities that had been carried since 2009 and the severe economic contraction resulting from the health crisis. As a result, the ratio of total public sector debt to GDP is expected to reach a level close to 54% during 2021, as suggested by this projection. This level is the highest in more than a decade and, although it does not seem to be a major risk, it brings Mexico closer to a situation of fiscal unsustainability. These data suggest that there is currently a higher risk of debt unsustainability and very limited fiscal space.

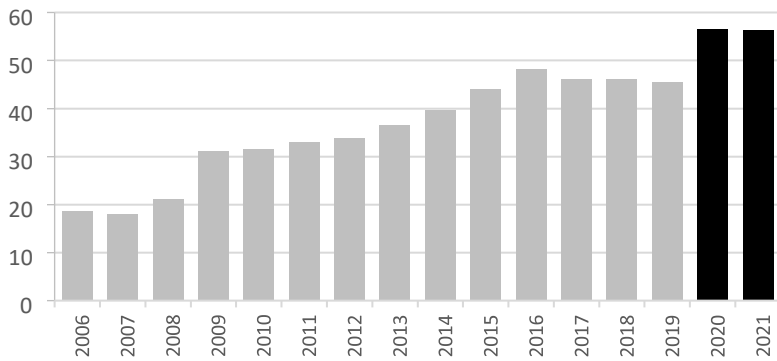

Figure 1. Total debt as a proportion of GDP, d, (%)

Furthermore, the historical balance of public sector financial requirements—the broadest measure of debt—went from representing 44.7% of GDP at the end of 2019 to 53.5% in the third quarter of 2020. Undoubtedly, this increase in debt restricts the degree of freedom the government has to undertake higher government spending through higher deficits.

Figure 2 presents the primary balance as a proportion of GDP. A larger primary balance increases the room to run deficits without risking sustainability. Given the economic contraction and the exchange rate mismatch resulting from the health crisis, the primary surplus moved into deficit after 2020 in an inertial manner; that is, without the government running a deficit to finance countercyclical spending. Likewise, the series forecast suggests that this balance will maintain this pattern through 2021.

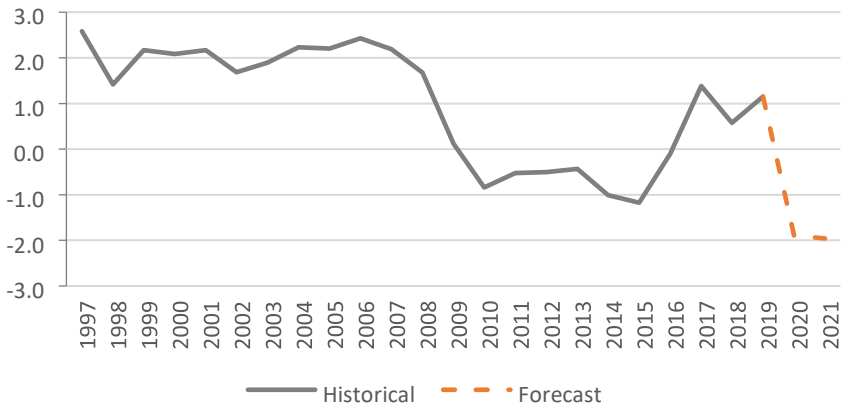

Figure 2. Primary balance as a share of GDP, sp, (%)

Finally, the government's budget constraint and fiscal sustainability are strongly associated with the interest rate and the growth of the economy. Figure 3 suggests that, although there will be an economic recovery in 2021, the size of the Mexican economy will have shrunk, negatively affecting tax revenues and the government's budget. Moreover, although the interest rate paid on the debt will remain low, it will not be enough to offset the negative effect of the exchange rate depreciation on the value of the debt. These stylized facts suggest that it is very likely that Mexico's fiscal sustainability will not be fixed in the short term, which will make it very difficult to have a large fiscal space to carry out an expansionary fiscal policy in the same term.

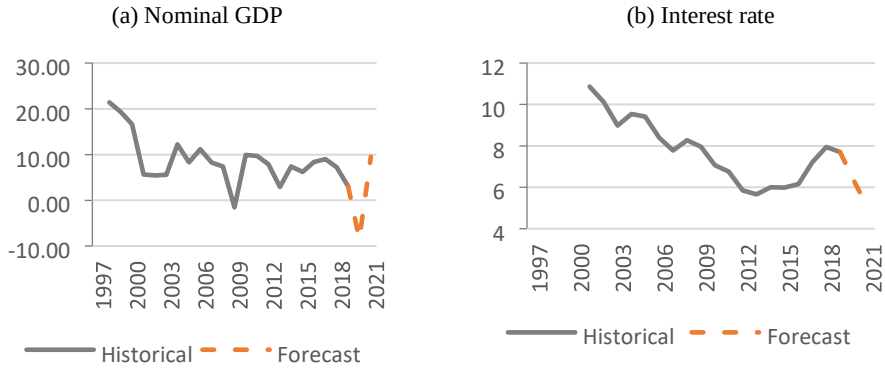

Figure 3. Percentage rate of GDP growth and interest rate of 10-year fixed-rate bonds

Econometric methodology for estimating fiscal space

For the estimation of fiscal space during 2020 and 2021, using Equation (7), it is necessary to estimate key variables of the economy that also serve to determine fiscal sustainability, such as the interest rate, government spending, tax revenues, primary balance, and economic growth (Talvi & Végh, 1998; Landolfo, 2008; Blanchard, 1990; CMCA, 2002). Thus, a Cointegrated Simultaneous Equation System is specified and estimated to forecast and estimate these 5 variables. It should be noted that the model includes 89 of the main variables of the Mexican economy and is initially specified as a set of distributed lag models (DLA). If the series are I (1) and cointegrate, the ADL models are re-specified as error-corrected models (ECM) (Mills, 2019). Once the accounting identities of the economy are added, the system of equations for the Mexican economy is solved by the Maximum Likelihood method (López, Sánchez & Spanos, 2011).

The DLA and ECM models, which were needed for the estimation of fiscal space, are presented in Table 1 and are consistent with the relations suggested by economic theory.

Table 1
Selected equations from the macroeconometric model

Nominal exchange rate [(1)] $\Delta LNER_t = 0.087 - 0.081\Delta(if_t - i_t^*) - 0.153\Delta Lop_t - 0.009[LNER_{t-1} + Lop_t]\frac{0.0002}{0.009}(\text{if}_t - \text{i}_t^*) + \frac{0.012}{0.009}\text{Lop}_t]$ (1) $\Delta\text{LNERt} = 0.087 - 0.081\Delta(\text{ift} - \text{ift}*) - 0.153\Delta\text{Lopt} - 0.009[\text{LNERt} - 1 + \text{Lopt}]\ 0.00020.009\ \text{ift} - \text{it}* + 0.0120.009\text{Lopt}]$	(1)
Interest rate: $if_t = 0.075 + 1.005i_t - 0.604i_{t-1}$	(2)
Banxico reference interest rate: $i_t = 0.473 + 0.857i_{t-1} + 0.229(\pi_t - \pi_t^*) + 0.090(y_t - y_t^*)$	(3)
Inflation: $\pi_t = 2.368 + 0.528\pi_{t-1} - 0.259u_{t-1} + 0.061\Delta gasoline + 0.011\Delta food\ price_{t-1}$	(4)
Identity of GDP: $y_t = x_t - m_t + \text{gg}_t + ip_t + cp_t + ve_t$	(5)
Government spending: $\text{ggt} = \text{igt} + \text{cgt}$	(6)
Public investment spending: $Lig_t = 11.724 + 0.723Lig_{t-1} - 0.748Lcg_{t-1} - 0.007rcetes_{t-1}$	(7)
Public consumption spending: $Lcg_t = 0.499 + 0.732\Delta Ly_t - 0.258[Lcg_{t-1} - 0.759Ly_{t-1}] - 0.004\ rbono10_{t-1}$	(8)

L indicates the logarithm of the variable, and Δ is the first difference of the referenced variables. NER is the nominal exchange rate, if is the funding interest rate, op is the WTI oil price, and i is the reference interest rate of Banco de México (Banxico). The inflation gap is the deviation of inflation (π) from Banxico's target inflation (π*). The output gap is defined as the deviation of output (y) from its potential level (y*). u is the unemployment rate, gg is government spending, ip is private investment, cp is private consumption, ve is the change in inventories, ig is public investment, cg is public consumption, rcetes is the real interest rate of Cetes, rbono10 is the real interest rate of 10-year bonds, y^{us} is U.S. GDP, and RER is the real exchange rate.

Source: created by the authors

As a method of verifying the model's assumptions, unit root tests were performed to determine the order of integration of the series and to decide the type of model appropriate for each specification. Only those equations with I(1) series that cointegrate were specified as error correction models (ECM). Correct specification tests were also performed, and then the cointegrated multi-equation model was estimated. Finally, the model was validated with tests of correct specification of the model (see appendix). The forecasts of the key variables, such as the primary balance, the interest rate, and the GDP growth rate, are obtained based on the macroeconometric model and the following equation:

$$wt = bp_t - \left(\frac{i-g}{1+g}\right)d* \tag{9}$$

To analyze the responses of debt to shocks to the debt itself, as well as to GDP, exchange rate, and interest rate, a VECM model was estimated (2):

$$\Delta y_t = a + \Pi y_{t-1} + \Sigma_{i=1}^{2} \Gamma_i \Delta y_{t-i} \quad (10)$$

y_t is a vector that accommodates the contemporaneous values of the logarithms of GDP, debt, exchange rate, and interest rate; Π=αβ^', is where the vector α captures the speed of adjustment of each of the variables to the long-run relation; and β is the vector of parameters of the cointegrating relation.

Results for fiscal space in the short term in Mexico

For the empirical analysis of the existence of fiscal space, the primary balance sustainability gap was used to estimate Equation (9) for the historical period 2006-2019 and, based on that estimate, to project 2020 and 2021 for comparative purposes. Different debt targets as a percentage of GDP (d*) were also considered. Estimates of the primary balance sustainability gap for 2020 and 2021 are based on projections of the primary balance, interest rate, and gross domestic product obtained using this macroeconomic model. Table 2 reports the evidence of fiscal space for the historical series since 2006 and the 2020 and 2021 projections. When the calculated indicator takes negative values, it can be concluded that there is no fiscal space; otherwise, there are degrees of freedom to increase government spending without generating fiscal unsustainability.

After the 2010-2015 global financial crisis, there was no fiscal space in the Mexican economy, as suggested by the negative values of the estimates for all possible targets for debt as a share of GDP. During this period, debt increased steadily, which is attributable to the government's expansionary spending policy. Subsequently, between 2016 and 2019, there was potential fiscal space associated with higher GDP growth, but in 2017 the government began to seek a fiscal surplus attributable to the increased risk of speculative attacks that depreciated the Mexican Peso. However, during 2020 fiscal space decreased again but this time due to the Covid-19 pandemic. It is worth mentioning that the underlying factors for this reduction are the dramatic decline in economic growth and the evolution of the exchange rate. It is also worth noting that a loss of fiscal space by 2021 is projected for different debt-to-GDP ratio targets. Even with a very high debt target of 70%, it can be concluded that there is no fiscal space.

Table 2
Historical and projected fiscal space for different fiscal deficit targets

Year	Sustainability gap with deficit target at 51.9%	Sustainability gap with deficit target at 56%	Sustainability gap with deficit target at 58%	Sustainability gap with deficit target at 70%
2006	2.54	2.55	2.56	2.58
2007	2.21	2.22	2.22	2.22
2008	1.62	1.62	1.62	1.60
2009	9.15	9.86	10.21	12.30
2010	-0.71	-0.70	-0.69	-0.66
2011	-0.38	-0.37	-0.36	-0.33
2012	-0.38	-0.37	-0.37	-0.34
2013	-0.80	-0.83	-0.84	-0.93
2014	-0.92	-0.91	-0.91	-0.89
2015	-1.16	-1.16	-1.16	-1.15
2016	0.02	0.03	0.03	0.06
2017	1.47	1.48	1.48	1.50
2018	0.54	0.53	0.53	0.52
2019	0.55	0.50	0.48	0.34
2020	-0.87	-0.79	-0.75	-0.51
2021	-1.73	-1.71	-1.71	-1.65

The target includes different levels of *d**. The data can be found at https://www.dof.gob.mx/nota_detalle.php?codigo=5597864&fecha=05/08/2020, section 7.- Welfare Targets and Benchmarks
The 2020 and 2021 data were forecasted using the SES model. The 2020 forecast verified the model's predictive capacity, yielding a result consistent with what was observed (see Table 4a in the appendix).
If the sustainability gap is negative, it is said that there is no fiscal space.
Source: created by the authors

It is interesting to note that, according to the estimated gap indicator, if the same trend of macroeconomic variables continues, the intertemporal budget constraint could be unsustainable by 2021. However, this will depend to a large extent on the recovery of the economic growth rate after the crisis. In fact, the best alternative route to promote better fiscal management of the country without generating instability and uncertainty is to raise the share of total productive investment and economic growth but without raising public debt excessively. Greater fiscal space will depend on directing public investment to high value-added sectors that generate short-term economic growth and strengthen long-term productivity and tax revenues. A strategy is needed from the government and the private sector to revive the economy, recognizing that the increase in the fiscal deficit must be sustainable.

Overall, this study's results show that whatever the federal government's debt target, in a range of 51-70% of GDP, Mexico would always have a negative primary balance sustainability gap. In fact, in 2021, Mexico could have increased risks of debt instability and no fiscal space, despite low-interest rates and rebounding economic growth by 2021. For there to be fiscal space, interest rates would need to be

even lower, and growth would need to increase beyond expectations. The primary balance sustainability gap turned out to be sharply negative (between -1.65 and -1.73% of GDP for Mexico). Thus, debt stability would be a concern, and there would be no fiscal space. In the case of Mexico, with a debt target of 70% of GDP (predicted by the Ministry of Finance), fiscal space would remain negative. Thus, all these results suggest that acquiring more debt would strongly impact financial conditions and stability in the near future.

To complement the analysis, based on a VECM model, the responses of debt to exchange rate, GDP, and interest rate shocks were estimated, considering three years (12 quarters). Figure 4 shows that a shock to the debt itself would lead to an immediate increase in its level and that the effect of that shock would stabilize and remain at a constant level. In the case of an exchange rate shock, debt would be expected to increase and then peak in about half a year, decline slightly, and then resume an upward trend. In the case of an interest rate shock, a small effect is observed, similar in magnitude to the response to an exchange rate shock, but with the opposite sign and stabilizing around that value.

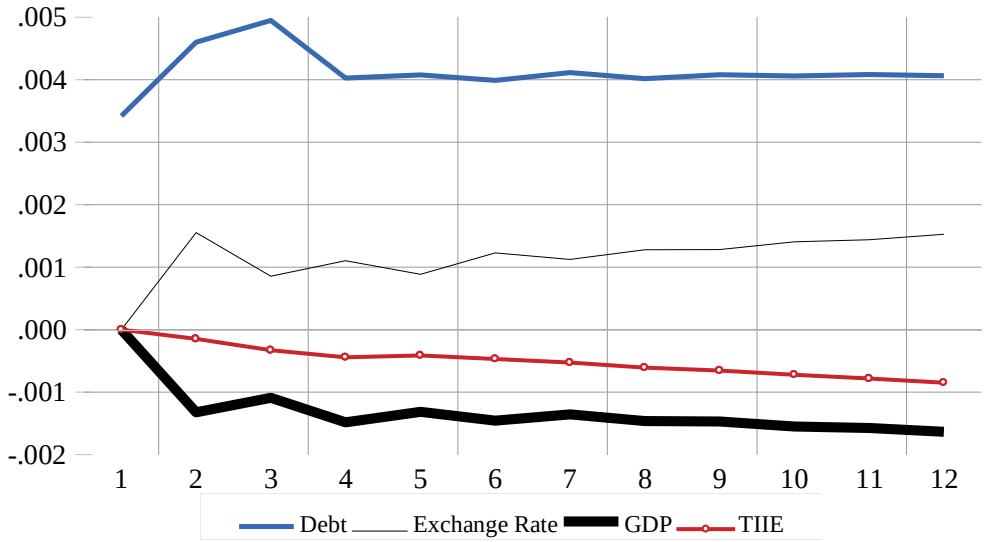

Figure 4. Responses of debt to shocks in selected variables
Source: created by the authors

Conclusions

In the scenario of an economic crisis caused by the outbreak of a disease like SARS-CoV-2, the best decision to make is to maintain or increase government spending without resorting to a higher level of

indebtedness. Increasing government spending on assistance programs for the population, companies, and productive investment projects is a strategy that could lessen the economic effects of the Covid-19 crisis, especially if, as established by Metelli and Pallara (2020), positive effects on the multiplier are achieved. However, given the estimates, there can be no doubt that there is no additional space for Mexico to expand the purchase of public debt.

Two issues will soon be of utmost importance to regain control and sustainability of public finances, thus contributing to macroeconomic stability and healthy economic growth. On the one hand, government spending must be reconsidered, identifying unavoidable spending (Villarreal & Villa, 2021), in addition to giving preference to priority sectors of the Mexican economy.

On the other hand, self-financing is necessary to improve fiscal space (Davies et al. 2016). Therefore, it is essential to establish a tax reform whose central objectives are income distribution and the expansion of the level of tax revenues in relation to GDP since, as stated by Aizenman and Jinjark (2011), countries with higher collection levels have a larger fiscal space, which is necessary to face situations such as those experienced during the pandemic. It is important to note that the changes in the organization of spending and the implementation of tax reform should be progressive in the medium term and, in the case of tax reform, undertaken in a context of economic growth.

References

Aizenman, J., y Jinjarak, Y. (2011). The Fiscal Stimulus of 2009–2010: Trade Openness, Fiscal Space, and Exchange Rate Adjustment. NBER International Seminar on Macroeconomics, 8(1), 301-342.

Basilio, M. E. (2018). Política fiscal procíclica y estabilidad monetaria en Brasil, Chile, Colombia, México y Perú. Revista Problemas del Desarrollo, 192 (49). https://doi.org/10.22201/iiec.20078951e.2018.192.59327

Blanchard, O. (1990). Suggestions for a new set of fiscal indicators. OECD Economics Department, Working Paper No. 79, abril. https://doi.org/10.1787/435618162862

Celasun, O., Grigoli, F., Honjo, K., Kaspsoli, J., Klemm, A., Lissovolik, B., Luksic, J., et al. (2015). Política fiscal en América Latina: Lecciones y legados de la crisis financiera mundial (Documentos de Análisis del Personal Técnico del fmi, sdn/15/06). Washington, D. C.: Fondo Monetario Internacional. Recuperado de: https://www.imf.org/~/media/Websites/IMF/imported-publi¬cationsloe.pdfs/external/spanish/pubs/ft/sdn/2015/sdn1506s.ashx

Claeys, P. (2007). Estimating the effects of fiscal policy under the budget constraint. Research Institute of Appliated Economics Working Paper 2007/15. http://www.ub.edu/irea/working_papers/2007/200715.pdf

Consejo Monetario Centroamericano, CMCA (2002). La sostenibilidad fiscal en Centroamérica, Secretaría Ejecutiva, junio.

Creel, J. (2020). Fiscal space in the euro area before Covid-19. Sciences Po OFCE Working Paper, 17, 1-15.

Davies, S., Saeed, W., Moeen, M., Tanveer, T., y Irshad, A. (2016). Fiscal Space for Investment in Agriculture—A Review of Taxes and Subsidies in Agriculture in Pakistan. The Pakistan Development Review, 55(4), 873-887.

Departamento de Finanzas Públicas del FMI (2020). Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic. https://www.imf.org/en/Topics/imf-andcovid19/Fiscal-Policies-Database-in-Response-to-COVID-19

Ghosh, A., Kim, J., Mendoza, E., Ostry, J., y Qureshi, M. (2013). Fiscal fatigue, fiscal space and debt sustainability in advanced economies. The Economic Journal, 123(566), F4-F30.

Gnangnon, S. y Brun, J. (2020). Tax reform and fiscal space in developing countries. Eurasian Economic Review, 10 (2), 237–265.

Hakkio, C. S., y Rush, M. (1991). Is the budget deficit too large?, Economic Inquiry, 29(3), 429-45. https://doi.org/10.1111/j.1465-7295.1991.tb00837.x

Hamilton, J. D., y Flavin, M. A. (1986). On the limitations of government borrowing: A framework for empirical testing, American Economic Review, 76 (4), 809-819. www.jstor.org/stable/1806077

Haroutunian, S., Hauptmeier S., y Leiner-Killinger, N. (2020). The COVID-19 crisis and its implications for fiscal policies, ECB Economic Bulletin. 2020(04). https://www.ecb.europa.eu/pub/economicbulletin/focus/2020/html/ecb.ebbox202004_07~145cc90654.en.html

Heller, P. (2005) Understanding Fiscal Space. FMI, Policy Discussion Paper, 04.

Kose, M., Kurlat, S., Ohnsorge, F. y Sugawara, N. (2017). A cross-country database of fiscal space. Policy Research Working Paper Series. 8157, 1-48.

Landolfo, L. (2008). Assessing the Sustainability of Fiscal Policies: Empirical Evidence from the Euro Area and the United States, Journal of Applied Economics, (11)2, 305-326, https://doi.org/10.1080/15140326.2008.12040509

Lopez, J., Sánchez, A. y Spanos, A. (2011). Macroeconomic Linkages in México. Metroeconomica, (62) 2, 356-385.

Lozano-Espitia, I., y Julio-Román, J. (2019). Límite de la Deuda Pública y Espacio Fiscal: Análisis para Colombia y Otros Mercados Emergentes. Borradores de Economia, 1076, 1-30.

Lunina, I., Bilousova, O. y Frolova, N. (2020). Tax Reforms for the Development of Fiscal Space. Baltic Journal of Economic Studies, 6(3), 48–58.

Machinea, J. L., Vásquez, L., y Zack, G. (2012). La ciclicidad de las políticas públicas latinoamericanas (1995-2010). Madrid: Fundación Carolina cealci. Recuperado de: https://www.fundacioncarolina.es/wp-content/uploads/2014/08/AI69.pdf

Metelli, L. y Pallara, K. (2020). Fiscal space and the size of the fiscal multiplier. Temi Di Discussione (Economic Working Papers), Bank of Italy, Economic Research and International Relations Area, 1923, 1-78.

Mills, T. C. (2019). Applied times Series Analysis. A practical guide to modeling and forecasting. Academic Press.

Ortiz, I., Cummins, M. y Karunanethy, K. (2017). Espacio fiscal para la protección social y los ODS alternativas para ampliar la inversión social en 187 países. ILO Working Papers, 48, 1-87.

Popovski, N. (2019). Fiscal Space in Small and Open Developing Economies. Vizione, 33, 383–392

Romer, C. y Romer, D. (2019). Fiscal Space and the Aftermath of Financial Crises: How It Matters and Why. Brookings Papers on Economic Activity,1, 239-331.

Romer, C. y Romer, D. (2019). Fiscal Space and the Aftermath of Financial Crises: How It Matters and Why . Brookings Papers on Economic Activity,1, 239-331.

Secretaría de Hacienda y Crédito Público (2013). Criterios generales de Política Económica 2014. México: SHCP.

Talvi, E., y Végh, C. A. (1998). Fiscal Policy Sustainability: A Basic Framework. IDB Working Paper No. 107. http://dx.doi.org/10.2139/ssrn.1814651

Trehan, B., y Walsh, C. E. (1988). Common trends, the government budget constraint, and revenue smoothing, Journal of Economics and Dynamics and Control, 12 (2-3), 425-444. https://doi.org/10.1016/0165-1889(88)90048-6

Villarreal, H. y Villa, S. (2021). Medición Del Espacio Fiscal en México.Problemas Del Desarrollo. Revista Latinoamericana de Economía, 52, 31–56.

Wilcox, D. W. (1989). Sustainability of government deficits: Implications of the present value borrowing constraint, Journal of Money Credit and Banking, 21(3), 291-306. https://www.jstor.org/stable/1992415

Yohou, D. (2020). Corruption, Tax reform and Fiscal space in Emerging and Developing Economies, FERDI Working paper P269, 1-38.

Appendix

Table A1
Unit root tests

	Augmented Dickey-Fuller			Phillips-Perron		
	Intercept	Trend and intercept	None	Intercept	Trend and intercept	None
Levels						
Log(GDP)	-3.985	-2.445	5.862	-3.985	-2.468	4.739
Log(Debt)	-1.767	-0.796	4.780	-4.205	0.322	4.780
I	-1.863	-0.790	-1.601	-2.263	-0.753	-1.470
Primary Balance	-1.559	-1.346	-1.214	-1.676	-1.490	-1.312
First difference						
Δ Log(GDP)	-1.958	-2.682	-2.057	-1.861	-2.675	-2.057
Δ Log(Debt)	-2.551	-3.971	-1.283	-2.626	-4.036	-1.145
Δ i	-3.075	-3.919	-3.082	-3.025	-3.747	-3.048
Δ Primary Balance	-4.050	-4.007	-4.133	-4.054	-3.984	-4.137
Second difference						
Δ^2 Log(GDP)	-4.663	-4.486	-4.466	-4.663	-4.486	-4.466
Δ^2 Log(Debt)	-4.176	-3.912	-4.344	-6.577	-5.731	-4.938
Δ2 .i	-6.307	-6.190	-6.598	-7.477	-7.703	-6.780
Δ^2 Primary Balance	-5.291	-5.352	-5.394	-13.612	-14.291	-14.060

Notes: (Δ) denotes the first difference of the series. The tests were performed for the period 2008-2018 using annual data. The critical table values at 95% confidence used are: Model intercept: -3.17 Model trend and intercept: -3.93. Model without trend and intercept: 1.97

Source: created by the authors based on the SES model

Table A2
Selected equations of the SES model

Nominal exchange rate [(1)]

$$\Delta LNER_t = 0.087 - 0.081\Delta(if_t - i_t^*) - 0.153\Delta Lop_t - 0.009\left[LNER_{t-1} + \frac{0.0002}{0.009}(if_t - i_t^*) + \frac{0.012}{0.009}Lop_t\right]$$

$$\Delta LNER_t = -6.324 + 0.192\,LNER_t - 0.003\,(if_{t-1} - i_{t-1}^*) - 0.047Lop_t + 0.425Ly_t$$

Banxico reference interest rate

$$i_t = 0.390 + 0.886it{-}1_{\,+\,0.189(\pi t\,-\,\pi t*)} + 0.098(yt_{\,-\,y^t*})$$

Interbank funding interest rate

$$\Delta fondeo_t = 0.046 + 0.993\,\Delta i_t - 0.494\left[fondeo_t - \frac{0.486}{0.494}i_{t-1}\right]$$

28-day interbank interest rate

$$\Delta tiie_t = -0.018 + 0.963\,\Delta fondeo_t - 0.283\left[tiie_t - \frac{0.307}{0.283}fondeo_{t-1}\right]$$

28-day Cetes

$$\Delta cetes_t = -0.059 + 0.606\,\Delta tiie_t - 0.633\left[cetes_t - \frac{0.224}{0.633}tiie_{t-1}\right] + 0.397fondeo_t$$

10-year fixed-rate government bond $$\Delta bono10_t = 0.665 + 0.671\,\Delta yield_t + 0.323\,\Delta cetes_t - 0.195\left[bono10_t - \frac{0.224}{0.633} yield_{t-1} - \frac{0.043}{0.633} cetes_{t-1}\right]$$
Inflation $$\pi_t = 2.368 + 0.528\pi_{t-1} - 0.259u_{t-1} + 0.061\Delta gasoline + 0.011\Delta food\ price_{t-1}$$
Unemployment rate $$u_t = 0.698 + 0.854u_{t-1} - 0.037\Delta y_t$$
GDP Identity $$y_t = x_t - m_t + \boldsymbol{gg_t} + ip_t + cp_t + ve_t$$
Exports $$\Delta Lx_t = -6.801 + 3.992\Delta Ly_t^{US} - 0.297\left[Lx_{t-1} - \frac{0.679}{0.297} Ly_{t-1}^{us}\right] + 0.024LRER_t$$
Imports $$\Delta Lm_t = 0.821 - 0.664[Lm_{t-1}] + 0.661Ly_t - 0.198LRER_t$$
Government spending $$\boldsymbol{gg_t} = \boldsymbol{ig_t} + \boldsymbol{cg_t}$$
Public investment spending $$Lig_t = 17.804 + 0.381Lig_{t-1} - 0.723Lcg_{t-1} - 0.019rcetes_{t-1} - 0.238Lop_{t-1}^{mx}$$
Public consumption spending $$Lcg_t = 3.892 + 0.673Lcg_{t-1} + 0.162Lit^{sp} - 0.050\ Lig_{t-1}$$
L indicates the logarithm of the variable, and Δ is the first difference of the referenced variables. NER is the nominal exchange rate, if is the funding interest rate, op is the price of WTI oil, op^{mx} is the price of the Mexican blend, i is the reference interest rate of Banco de México (Banxico). The inflation gap is the deviation of inflation (π) from Banxico's target inflation (π*). The output gap is defined as the deviation of output (y) from its potential level (y*). u is the unemployment rate, x is exports, m is imports, gg is government spending, ip is private investment, cp is private consumption, ve is changes in inventories, ig is public investment, cg is public consumption, rcetes is the real interest rate of Cetes, rbono10 is the real interest rate of 10-year bonds, y^{us} is U.S. GDP, and RER is the real exchange rate. The price of crude oil was taken as an exogenous variable and the forecast of the U.S. Energy Information Administration was used.

Source: created by the authors

Table A3
Forecasting of selected SES model variables

	2018	2019	2020*	2021*
Real sector				
Real GDP, annual variation (%)	2.2	-0.3	-10.3	7.9
Nominal GDP, annual variation (%)	7.3	3.0	-8.5	9.5
Reference prices and rates				
Inflation (%)	4.9	3.6	2.8	3.3
Interest rate on 10-year government bonds, (%)	8.0	7.7	6.3	5.0
Nominal exchange rate (peso/dollar)	19.2	19.3	21.8	21.7
Public Sector				
Primary balance (as a proportion of GDP)	0.6	1.2	-1.9	-2.0
Total debt (as a proportion of GDP)	46.0	45.5	56.6	56.2
Data for 2020 and 2021 correspond to the trend forecast				

Source: created by the authors with data from the SES model