

COUNCIL *on*
FOREIGN
RELATIONS

Center for Geoeconomic Studies

WORKING PAPER

Spillovers From Falling Oil Prices: Risks to Mexico and the United States

Michael A. Levi, Alexandra Mahler-Haug, and Shannon K. O'Neil
December 2014

*This Working Paper was made possible through the generous support of the
Alfred P. Sloan Foundation.*

The Council on Foreign Relations (CFR) is an independent, nonpartisan membership organization, think tank, and publisher dedicated to being a resource for its members, government officials, business executives, journalists, educators and students, civic and religious leaders, and other interested citizens in order to help them better understand the world and the foreign policy choices facing the United States and other countries. Founded in 1921, CFR carries out its mission by maintaining a diverse membership, with special programs to promote interest and develop expertise in the next generation of foreign policy leaders; convening meetings at its headquarters in New York and in Washington, DC, and other cities where senior government officials, members of Congress, global leaders, and prominent thinkers come together with CFR members to discuss and debate major international issues; supporting a Studies Program that fosters independent research, enabling CFR scholars to produce articles, reports, and books and hold roundtables that analyze foreign policy issues and make concrete policy recommendations; publishing *Foreign Affairs*, the preeminent journal on international affairs and U.S. foreign policy; sponsoring Independent Task Forces that produce reports with both findings and policy prescriptions on the most important foreign policy topics; and providing up-to-date information and analysis about world events and American foreign policy on its website, CFR.org.

The Council on Foreign Relations takes no institutional positions on policy issues and has no affiliation with the U.S. government. All views expressed in its publications and on its website are the sole responsibility of the author or authors.

For further information about CFR or this paper, please write to the Council on Foreign Relations, 58 East 68th Street, New York, NY 10065, or call Communications at 212.434.9888. Visit CFR's website, www.cfr.org.

Copyright © 2014 by the Council on Foreign Relations® Inc.
All rights reserved.

This paper may not be reproduced in whole or in part, in any form beyond the reproduction permitted by Sections 107 and 108 of the U.S. Copyright Law Act (17 U.S.C. Sections 107 and 108) and excerpts by reviewers for the public press, without express written permission from the Council on Foreign Relations.

The authors thank Stephanie Leutert, Sabina Frizell, Gilberto Garcia, and Allison Dorey for research assistance and Jorge Suarez and three anonymous reviewers for valuable comments. They also thank the Alfred P. Sloan Foundation for its support of the CFR Project on Energy, Economics, and International Security. The Sloan Foundation takes no positions on policy issues.

Introduction

U.S. policymakers who worry about the impact of energy developments on geopolitics typically think of high oil prices as bad news and low prices as an unalloyed good. But a sustained drop in oil prices can be dangerous as well. Investigating Mexican vulnerability to falling oil prices—and spillovers to the United States—shows how troublesome such a development might be.

The Mexican government depends on oil production: in 2013, levies on domestic oil output provided \$65 billion, roughly a third of the federal government budget.¹ This reliance has been the case for years—over the last decade, oil levies have fluctuated between 25 and 44 percent of the federal government’s total income. Mexico’s energy reforms, which moved forward decisively in August 2014, may eventually reduce the government’s fiscal dependence. Even so, the reforms must still be implemented, and change will be slow.² The Mexican government will continue to rely on oil-related revenues at least through this decade’s end.

This leaves the Mexican Treasury vulnerable to falling international oil prices. A large and long-enough drop could force the Mexican government to raise taxes or cut spending, with fallout domestically and, potentially, for the United States through its deep economic, security, and community ties with its southern neighbor. Even before oil prices fell substantially in the third quarter of 2014, this was an important possibility to analyze and prepare for; the price plunge that began in earnest in October 2014 makes it urgent.

To explore what might happen if Mexico faced a significant oil shock, we modeled a range of possible oil price developments, estimated the impact on Mexican government finances in each case, and then assessed the possible consequences and options for the Mexican government. In each case we identified potential consequences for Mexican society and spillovers to the United States. This in part extends work done by the International Monetary Fund (IMF), which, in reviewing the Mexican economy, stress tests shocks to Mexican gross domestic product (GDP), the Mexican budget deficit, the value of the peso, and Mexican interest rates, but does not explicitly model oil price shocks or explore the domestic and international political consequences of their scenarios.³

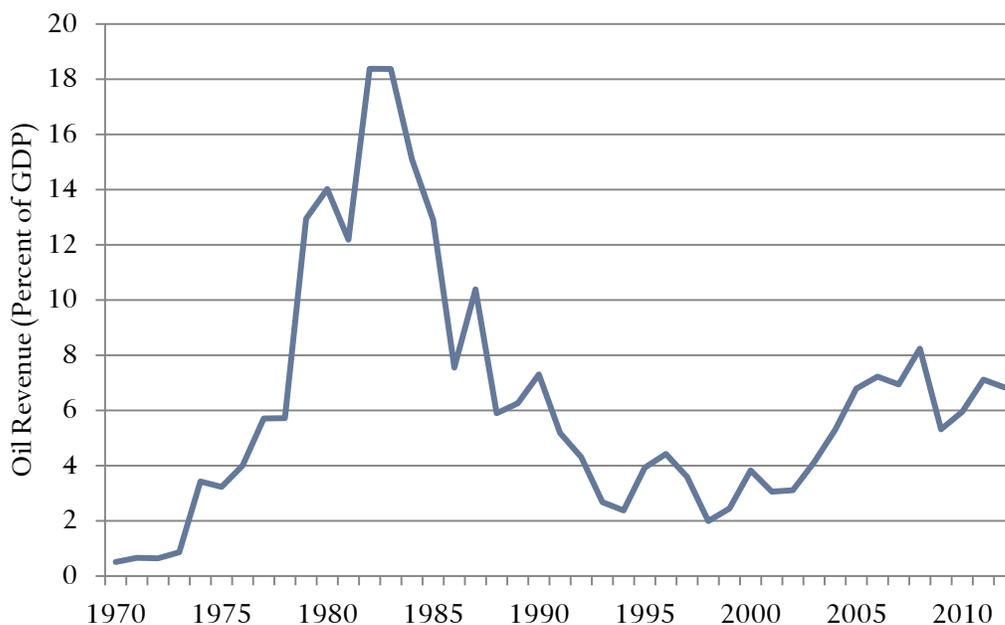
Mexico could likely weather moderate or gradual drops in oil prices, but larger or more sudden oil price drops could seriously challenge the Mexican government’s fiscal situation. (The relevant scales are elaborated throughout this paper.) Though the most challenging of these scenarios for the Mexican economy are the least likely to occur, they are plausible enough that policymakers in both Mexico and the United States should take concrete steps to address these risks. Expanding IMF stress tests, preparing for government-to-government loans, and increasing the size of Mexico’s non-oil economy would all help either anticipate stressful situations or ease pressure on the Mexican economy and political system should these severe price scenarios occur.

Oil's Role in Mexico's Economy, Politics, and Government

For more than one hundred years, the changing health of Mexico's energy sector, led by oil, has strongly influenced the country's politics and economy. The ebbs and flows of energy revenues have bolstered and undermined successive Mexican governments, at times expanded the country's middle class and then thrown millions back into poverty, and made *Petróleos Mexicanos* (Pemex), the national oil company, both a powerful and a politicized institution.

The most recent surge in Mexican dependence on oil production began in 1971, when Rudesindo Cantarell, a poor Mexican fisherman in the state of Campeche, inadvertently discovered Mexico's most productive oil field (and at the time, the world's third largest) while out casting his nets. Mexico's production increased steadily over the next three decades. Meanwhile, oil prices initially rose strongly. The combined boost in production and price created a flood of oil wealth for Mexico. At its height, energy made up over 70 percent of the country's exports and oil revenues accounted for nearly 20 percent of Mexico's GDP.⁴

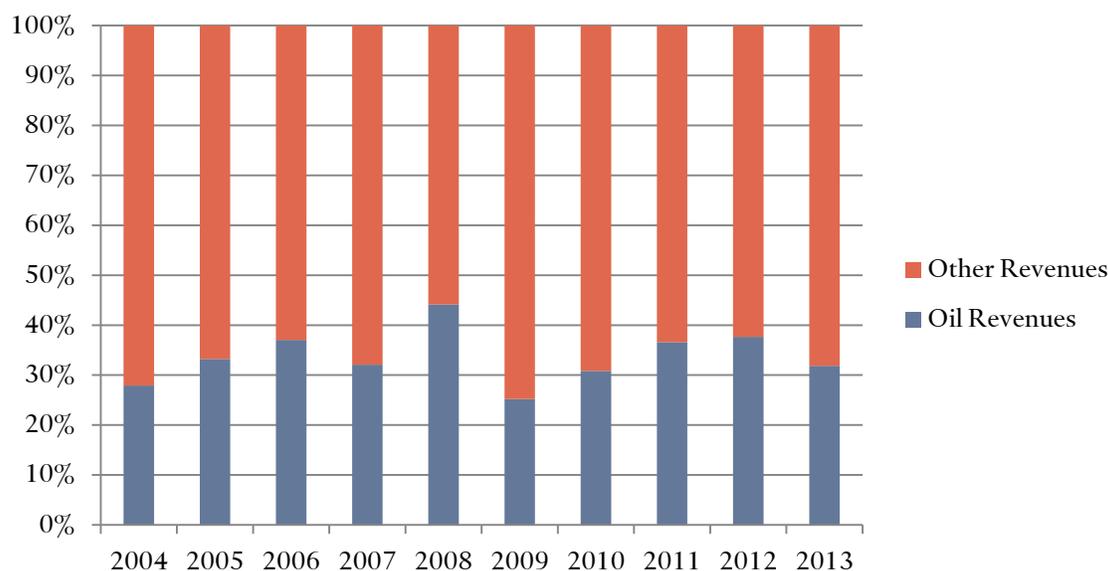
FIGURE 1: MEXICO'S OIL REVENUE



Source: World Bank Database, Oil Rents (percentage of GDP).

After peaking in the 1980s, oil began to decline in importance for Mexico's economy. As of 2012, manufactured goods comprised some 75 percent of total exports, far surpassing oil's 14 percent, and oil production contributed 7 percent of Mexico's GDP.⁵ Yet oil revenues remain essential to the Mexican government (Figure 2).⁶

FIGURE 2: FEDERAL GOVERNMENT REVENUE BY SOURCE



Source: Secretaría de Hacienda y Crédito Público, Ingresos Presupuestarios del Gobierno Federal.

All Mexican oil production is currently undertaken by the national oil company, Pemex. Though this will gradually change over time as reforms open the sector to outside capital, analysts expect that Pemex will still control the majority of Mexican production.⁷ As a result, in order to explore oil-related government revenues in the coming years, we focus on Pemex. (Analysis beyond our horizon would need to incorporate tax and royalty revenue from companies other than Pemex.)

Over the last four decades, Pemex has pumped hundreds of billions of dollars into Mexico's Treasury; in 2013 alone it relinquished approximately \$65 billion (54 percent of its total sales revenue and 119 percent of operating income) to the federal government.⁸ Pemex pays several annual duties, mainly based on the value of extracted oil and natural gas.⁹ The largest is the Ordinary Hydrocarbons Duty (OHD), which charges a fixed per-unit fee on all oil and natural gas produced. (Most OHD revenue comes from oil sales.) In 2013, it totaled \$56 billion, roughly 85 percent of Pemex's tax burden. The second largest is the hydrocarbons duty for the government's Oil Stabilization Fund, equal to 10 percent of the sale price of each barrel of oil.¹⁰ Although designed to provide a hedge against price volatility, in practice the fund totaled just 1 percent of GDP as of 2012, limiting its usefulness as a countercyclical tool.¹¹ At least seven other taxes make up the rest of the burden.¹² Appendix 1 describes in detail how this paper models the Mexican tax and duty regime to translate oil prices and production levels into Mexican government income.

Scenarios

Given the Mexican government's dependence on Pemex, how much would plunging oil prices strain the Mexican budget? To explore possible paths we investigated nine scenarios.

Scenario 1 is the reference case. It assumes that Pemex-owned Mexican oil production (including lease condensates) holds steady at about 2.35 million barrels a day through 2020, consistent with Pemex estimates of expected 2014 production and September 2014 U.S. government projections that Mexican production is likely to hold steady in the near term.¹³ It also assumes that Mexican federal spending rises at 5 percent (real) annually, consistent with recent IMF projections.¹⁴ (Lower oil production or higher government spending than expected in this baseline would add to any fiscal stress created by lower oil prices, but the three factors are separable for the purposes of this analysis.) Scenario 1 also assumes a constant (real) oil price of \$100 per barrel through 2020, similar to what was anticipated by the forward curve as of mid-2014.¹⁵ Using these assumptions means that oil revenue shortfalls projected by this analysis should be read as being relative to expectations as of mid-2014. Accordingly, any adjustments to borrowing, non-oil revenues, and spending that this analysis concludes might be necessary are relative to Mexican plans as of mid-2014 too.

Figure 3 shows projected oil-related revenue as a percentage of government spending for Scenario 1. In this base case, oil-related revenues decline steadily from 28 percent of government spending in 2014 to 21 percent of government spending in 2020. In order to compensate for this decline, non-oil tax revenues or borrowing (likely both) will need to increase even absent a fall in the oil price. Such increases are planned and broadly expected to succeed: tax intakes have historically risen and recent reforms to the tax code should increase collection.

FIGURE 3: GOVERNMENT REVENUE FROM PEMEX AS PERCENTAGE OF TOTAL FEDERAL GOVERNMENT SPENDING (2012) IN BASELINE CASE (SCENARIO 1)

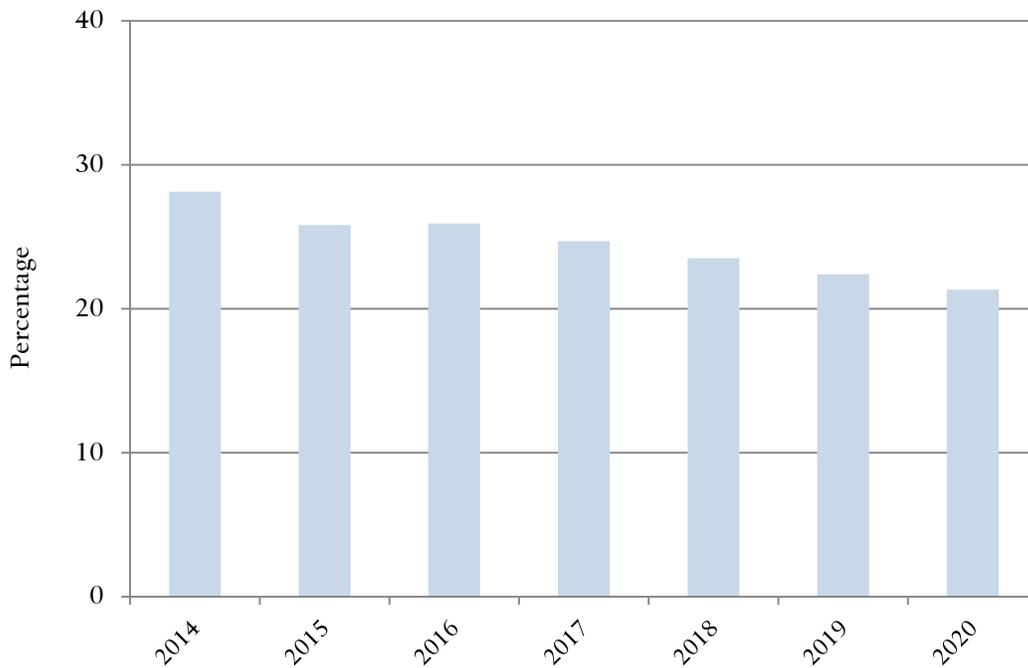
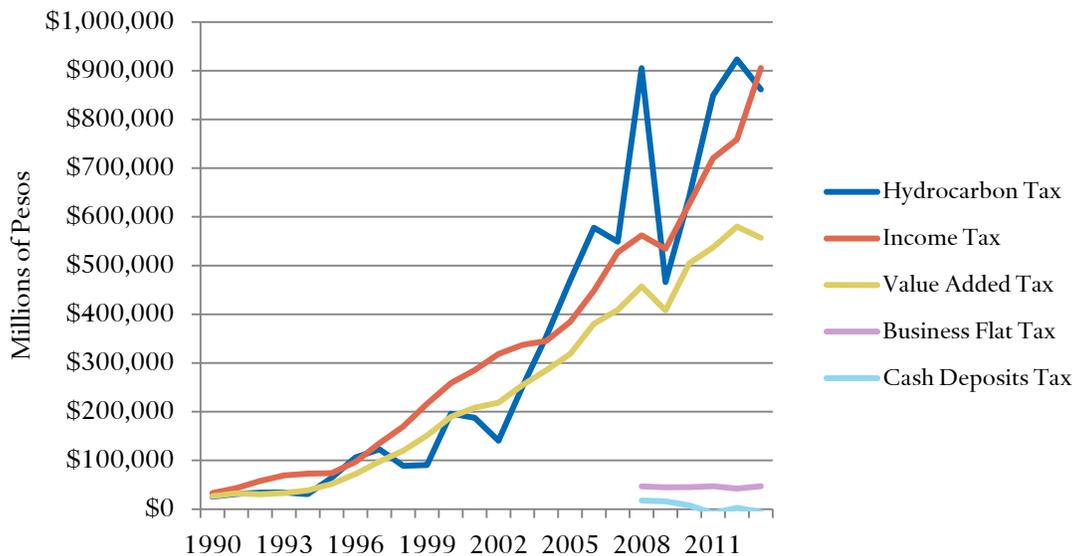


FIGURE 4: SELECTED TAXES (1990–2013)



Source: Secretaría de Hacienda y Crédito Público, Ingresos Presupuestarios del Gobierno Federal.

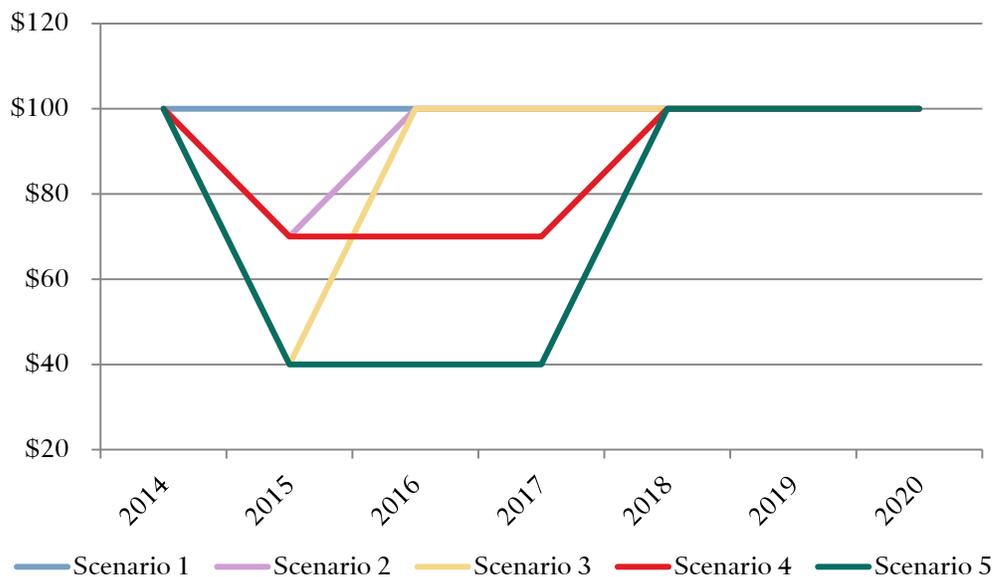
Scenarios 2 to 5 involve sudden (each unfolds in the span of just one year) but temporary oil price declines. They are differentiated by the magnitude of the price drop (\$30 or \$60) and its longevity

(one or three years). Figures 5 and 6 summarize these scenarios and their price trajectories. To simplify the analysis, we do not model any revenue shortfall resulting from falling 2014 prices, which is limited by the late timing of the 2014 price decline and by Mexican hedging at a relatively high price.¹⁶ Though all of the scenarios studied here envision price declines that begin no later than 2015, the results would be largely unaltered for price declines that began later.

FIGURE 5: CHARACTERISTICS OF OIL PRICE SCENARIOS 2–5

		Size of price decline	
		Smaller (\$30/bbl)	Larger (\$60/bbl)
Duration of price decline	Shorter (1 year)	Scenario 2	Scenario 3
	Longer (3 years)	Scenario 4	Scenario 5

FIGURE 6: OIL PRICE SCENARIOS 2–5

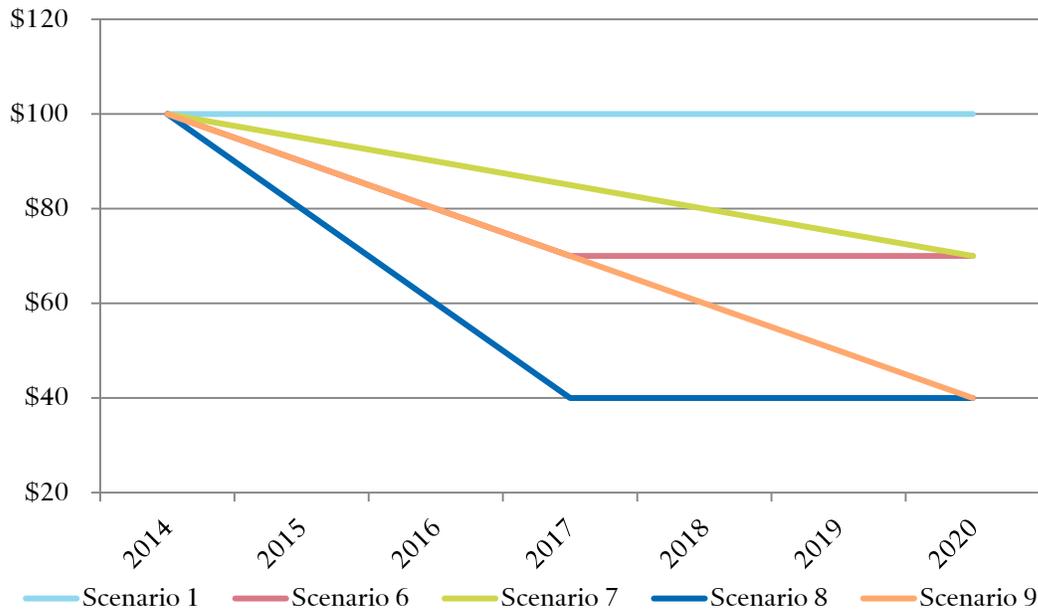


Scenarios 6 to 9 all involve price declines that are slower than those in scenarios 2–5 but that are persistent. They are differentiated by the magnitude of the price drop (\$30 or \$60) and the period over which it occurs (three or six years). Similarly to Scenarios 2 to 5, we do not model any revenue shortfall for 2014. Figures 7 and 8 summarize these scenarios and their price trajectories.

FIGURE 7: CHARACTERISTICS OF OIL PRICE SCENARIOS 6–9

		Pace of price decline	
		Faster (Unfolds over 3 years)	Slower (Unfolds over 6 years)
Size of price decline	Smaller (\$30/bbl)	Scenario 6	Scenario 7
	Larger (\$60/bbl)	Scenario 8	Scenario 9

FIGURE 8: SCENARIOS 6–9 (PRICE TRAJECTORIES)



Assigning probabilities to each of these scenarios is impossible. Each scenario is, however, plausible. A temporary price drop (Scenarios 2–5) might be driven by overinvestment in oil production relative to world demand. Overinvestment could be the consequence of poor decisions by oil producers or rapid technological change that quickly affects oil production or consumption. It might also be driven by unexpected but temporary economic weakness. (All of these forces conspired to drive prices down sharply in the fourth quarter of 2014.) In all cases, the drop is temporary because the long-run marginal cost of production, which drives long-run prices, remains unchanged. Scenarios 2–5 would thus be characterized by a long-run marginal cost of production that remains around \$100 per barrel, so that prices return to that level once excess supply has been shut in, excess planned investment eliminated or deferred, or demand has recovered. The time it takes for this to happen depends

on decisions made by oil producers and on the dynamics of consuming economies that are difficult to predict; hence the different possible durations for a temporary price drop.

In contrast, in all of the scenarios (6–9) in which the price drop is sustained (or at least lasts through 2020), the long-run marginal cost of production is below \$100 per barrel, which is what drives long-run prices down. The long-term price in those scenarios (6–7) where prices fall to \$70 is similar to that in the Energy Information Administration’s 2014 “low oil price” case, which reflects assumptions of lower global oil demand (at any given price) and higher global oil supply than expected.¹⁷ The scenarios (8–9) in which long-term prices fall to \$40 are extreme cases that are unlikely to prevail, given that a large fraction of world oil production appears to have marginal costs above this level, but are included for completeness.

Revenue Results

Figures 9 and 10 show how Pemex receipts as a portion of government spending would change in the face of the oil price drops described in Scenarios 2–9. Table 1 shows the cumulative 2015 to 2020 revenue shortfall for each case.

FIGURE 9: REVENUE FROM PEMEX AS PERCENTAGE OF FEDERAL GOVERNMENT SPENDING (2012), SCENARIOS 2–5

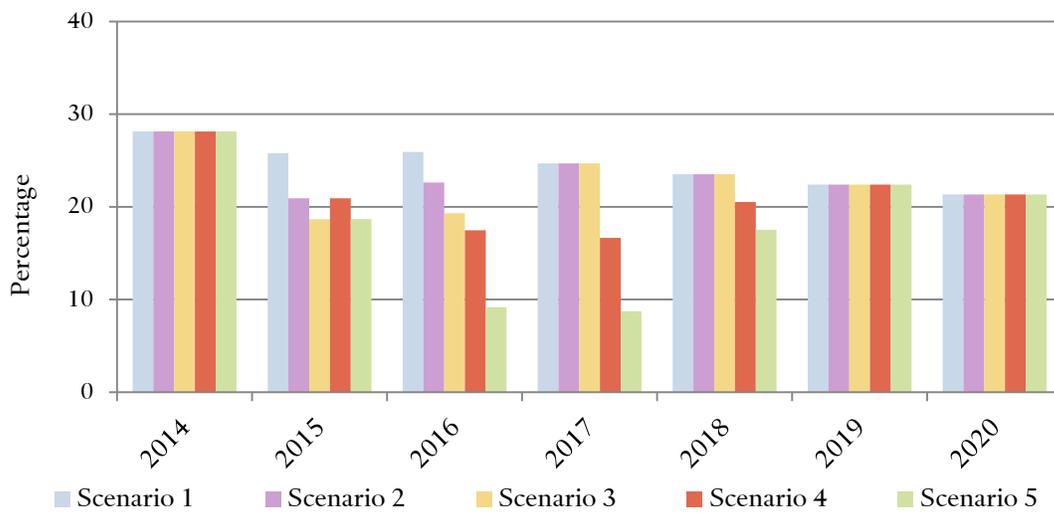


FIGURE 10: REVENUE FROM PEMEX AS PERCENTAGE OF FEDERAL GOVERNMENT SPENDING (2012), SCENARIOS 6–9

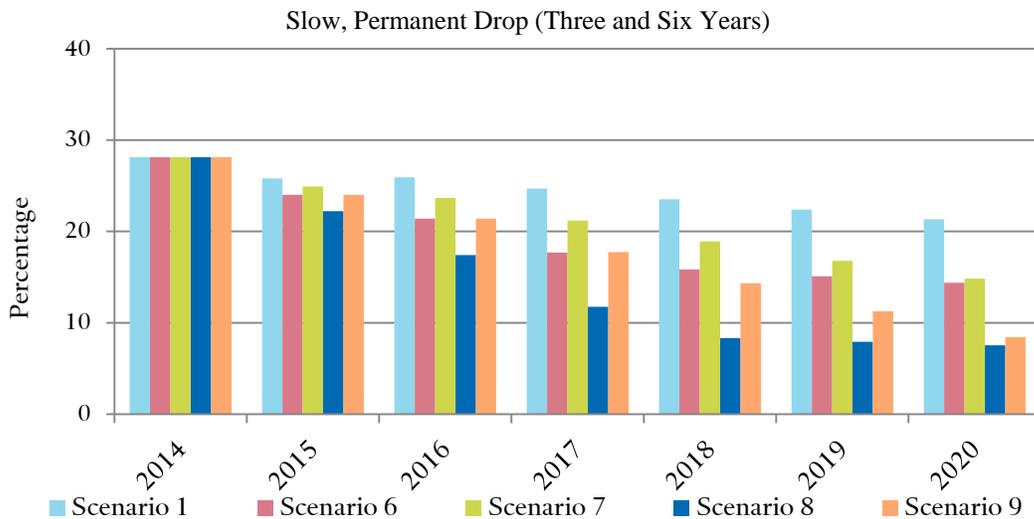


TABLE 1: CUMULATIVE REVENUE SHORTFALLS RELATIVE TO REFERENCE CASE (SCENARIO 1)

Scenario	Cumulative revenue shortfall (2015–2020), in billions of U.S. dollars	Cumulative revenue shortfall (2015–2020), as percentage of 2013 GDP
2	19	2
3	32	3
4	60	5
5	113	9
6	94	8
7	63	5
8	183	15
9	126	10

Several broad features of these results are noteworthy. First, for temporary oil price falls, the decline in Mexican government revenues persists beyond the duration of the oil price shock itself. This is largely because Mexico sets its budgeted oil price, which helps determine how much it will levy from Pemex for each barrel of oil sold, one year ahead of when it actually receives any money from Pemex. With oil prices depressed, the budgeted price declines, ultimately lowering the Mexican government’s future take. Second, when prices plunge quickly but then remain low, it takes several years for the budgetary impact to be fully felt. This is because Mexico hedges some its revenues from oil sales one year into the future, masking the full impact of any price decline at first, but eventually ceasing to protect Mexican revenues. Third, as one would expect, when prices decline more slowly, this puts less initial stress on government budgets. Fourth, two of the most stressful scenarios are, fortunately, the ones that are most unlikely: those in which prices fall to \$40 per barrel and remain there (Scenarios 8 and 9).

TABLE 2: FEDERAL GOVERNMENT REVENUE SHORTFALL

Annual revenue shortfalls, in billions of U.S. dollars (percentage of GDP in parentheses)						
Scenario	2015	2016	2017	2018	2019	2020
2	11 (1%)	8 (1%)	-	-	-	-
3	16 (1%)	16 (1%)	-	-	-	-
4	11 (1%)	20 (2%)	20 (2%)	8 (1%)	-	-
5	16 (1%)	41 (3%)	41 (3%)	16 (1%)	-	-
6	4 (0.3%)	11 (1%)	18 (1%)	20 (2%)	20 (2%)	20 (2%)
7	2 (0.2%)	5 (0.4%)	9 (1%)	12 (1%)	16 (1%)	19 (2%)
8	8 (1%)	21 (2%)	33 (3%)	41 (3%)	41 (3%)	41 (3%)
9	4 (0.3%)	11 (1%)	18 (2%)	24 (2%)	31 (3%)	38 (3%)

Mexico's Options

In the face of an oil price shock, Mexico has three main policy options: increase debt, raise revenue, or cut spending. It is likely to pursue a combination of all three in response to any significant revenue shortfall. It previously had a fourth option—use money in its Oil Stabilization Fund to cover any shortfall. Indeed, in the aftermath of the 2008 financial crisis, it used the stabilization fund to plug its budget and to fund a stimulus as well, all while not significantly increasing its annual bond issuance (as measured in pesos).¹⁸ In recent years, though, Mexico has chosen not to save a significant amount of money in the stabilization fund, removing that as an option for future contingencies.

An oil price shock would also likely weaken the Mexican peso. The mechanism would be indirect: “By law, the National Oil Company (Pemex) sells to the central bank the dollars it obtains from its exports. Naturally, the central bank sterilises [sic] this operation. . . . From a partial equilibrium perspective and being off-market, these transactions should not be a matter of great concern. . . . [But] from a general equilibrium perspective, the quantity of dollars the central bank obtains from Pemex could have an impact on the bank’s decisions.”¹⁹ Any fall in the peso would blunt (but far from fully offset) any blow to the Mexican budget from falling oil prices, since the peso-denominated decline in the price of oil would be smaller than the U.S. dollar-denominated drop. This would not, however, be a free lunch: the falling peso would boost inflation and hence reduce Mexican government spending in real terms. (To the extent that Mexican government spending rises with inflation, peso-denominated spending would rise too, eroding some of the budgetary benefit of the falling peso.) The size of this decline would depend on decisions by the Mexican central bank. We do not try to model the complex economic and political dynamics of exchange-rate adjustment; instead, in the analysis below, allowing the peso to adjust should be seen as an alternative way of cutting spending.

INCREASE DEBT

To the extent that it is possible, increasing debt will be the most attractive response to a revenue shortfall, as borrowing allows the Mexican government to avoid painful domestic policy changes and to spread the costs of absorbing the price shock over time.

Table 3 summarizes Mexican government debt as of the end of 2013. Most debt is in the form of federal government bonds and the majority of that is denominated in pesos.

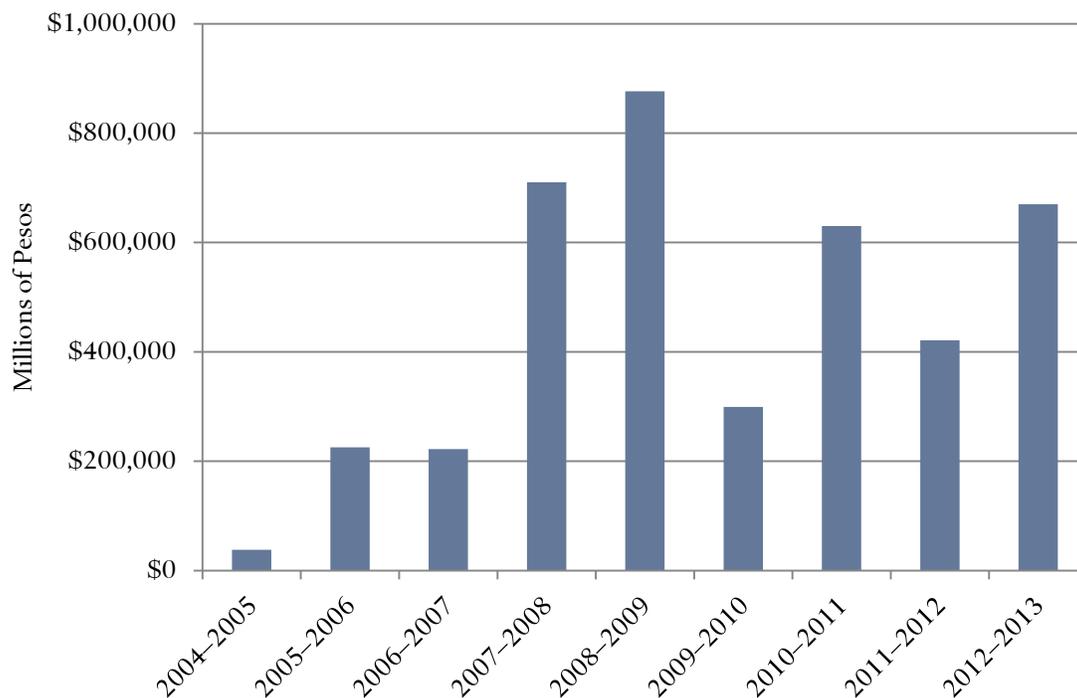
TABLE 3: MEXICAN DEBT (IN MILLIONS OF U.S. DOLLARS)

2013 Gross Federal Government Debt	382,904.6
Peso-denominated	310,724.2
Foreign currency-denominated	72,180.4
Gross State-Owned Companies Debt	73,798.6
Peso-denominated	20,440.5
Foreign currency-denominated	53,358.1
Gross Development Banks Debt	14,893.2
Peso-denominated	5,995.8
Foreign currency-denominated	8,897.4
Total Debt	471,596.4
Total peso-denominated debt	337,160.5
Total foreign currency-denominated debt	134,435.9
Government's Guaranteed Debt	99,736.2
Total Debt Including Guaranteed Debt	571,332.6

Sources: Secretaría de Hacienda y Crédito Público; International Monetary Fund.

Mexico maintains an investment-grade rating of BBB+ from Standard and Poor's, raised in late 2013 from BBB after its successful year of ambitious reforms, placing it ahead of countries such as Italy and Brazil, on par with countries such as Peru and Thailand, and behind countries such as Ireland.²⁰ Moody's rates Mexico's government bonds A3, indicating confidence that Mexico is likely meet its financial obligations, both of which make it easier for the country to borrow.²¹ In recent years, Mexico has consistently been able to borrow in a range of currencies at attractive rates. It also has a \$72 billion credit line with the IMF that has been reviewed and renewed annually, and that it has never drawn on.²²

FIGURE 11: YEAR-ON-YEAR CHANGE IN PUBLIC-SECTOR GROSS DEBT



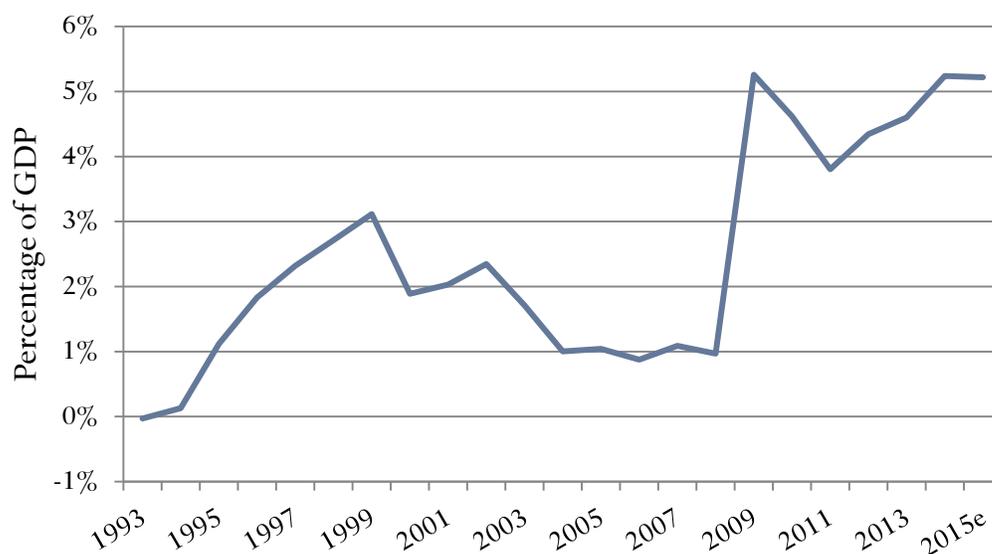
Source: Secretaría de Hacienda y Crédito Público, Saldos de la Deuda del Sector Publico Federal.

These circumstances imply that Mexico has could take on significantly more debt without engendering concern among creditors. The IMF has calculated Mexican gross debt at 46 percent of GDP at the end of 2013, significantly below the ratios maintained not just by many advanced economies but also other emerging markets such as Brazil (66 percent) or India (66 percent).²³ (Mexico also benefits from having a large part of its debt denominated in local currency.) If Mexico increased its debt to these levels (which might or might not be possible in practice) it could take on an additional \$235 billion in obligations.²⁴ The IMF has argued that, faced with a broad economic shock that forced Mexico to raise its debt to 55 percent of GDP, Mexican debt would remain “moderate.”²⁵ One potential worry is the substantial rise in state-level debt in recent years, which reached 483 billion pesos in 2013.²⁶ But most of these obligations are concentrated in a small number of states (Quintana Roo, Coahuila, Chihuahua, and Nuevo Leon together account for nearly one-third of all state debt) and the federal government has explicitly not guaranteed payment.

Nonetheless, overconfidence in the ability and willingness of the Mexican government to borrow could blind policymakers to significant risks that Mexico might be forced to raise revenues or cut spending in the face of an oil price shock. An overly rapid rise in debt could worry international investors and limit Mexican ability to quickly increase its debt burden: though the most stressful scenario studied here features a one-year increase in the Mexican deficit of 4 percent of GDP (beyond the expected annual deficit), the Mexican government did not issue new debt worth more than 3.7 percent of GDP in a single year between 2003 and 2013.²⁷ In addition, given the prominence of oil in

Mexican exports, an oil price plunge would result in a falling peso, which might further deter foreign investors. (Most Mexican debt, including debt held externally, is denominated in pesos.) Compounding this, Mexican policymakers might fear violating their longstanding pledge to (approximately) balanced budgets, which many of them credit for Mexico's successful ability to borrow relatively cheaply in international markets in recent years. Fearful of disrupting Mexico's ability to borrow, policymakers might choose to avoid adding significant amounts of new debt even when economic analyses suggest substantial capacity to do so.

FIGURE 12: MEXICO'S DEFICIT



Source: IMF, World Economic Outlook Database.

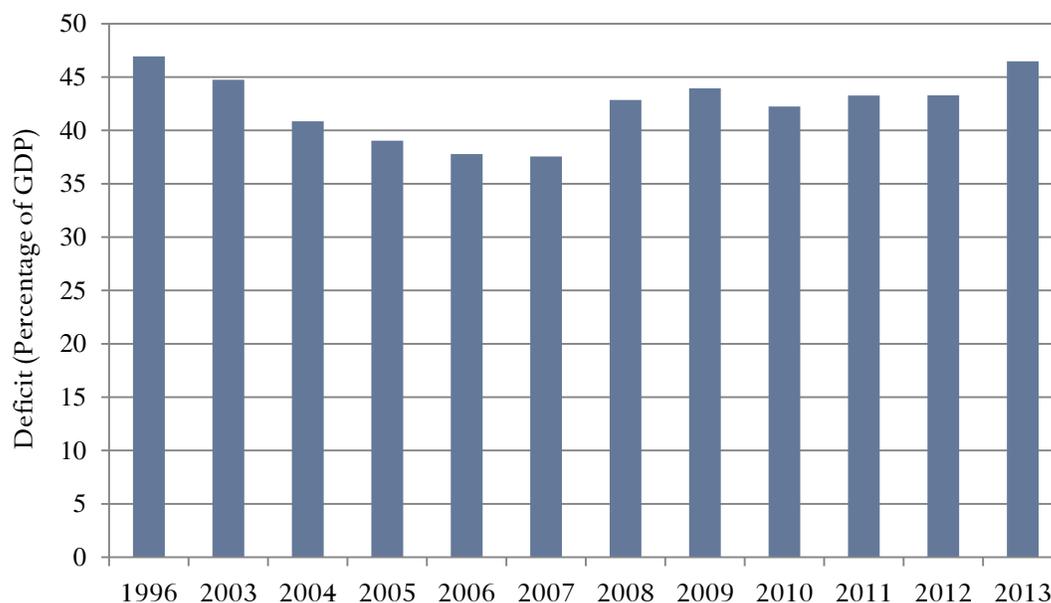
When might Mexico be unable or unwilling to fully neutralize an oil revenue shortfall by issuing new debt? This is most likely in Scenarios 5, 8, and 9, each of which feature a budget shortfall exceeding 2.5 percent of GDP in at least one year and a cumulative shortfall of at least 10 percent of GDP. (These thresholds are arbitrary but still useful for ranking scenarios.) It is also possible in Scenarios 4, 6, and 7, which each feature at least one year with a budget shortfall exceeding 1.5 percent of GDP; Scenario 6 is additionally stressful due to a cumulative budget shortfall exceeding 8 percent of GDP. Mexico is most likely to handle Scenarios 2 and 3 purely by issuing debt: in each, the annual budget gap never exceeds 1.5 percent of GDP and the cumulative shortfall is under 5 percent.

One might expect that the 2008 plunge in oil prices (the benchmark price fell from \$144 in July to \$34 in December) would shed light on Mexico's ability to issue large amounts of debt in order to plug a budget deficit during the sorts of scenarios explored here. Unfortunately, that experience is a poor precedent. Lower than expected oil prices in the second half of 2008 were offset by higher than expected prices in the first half of that year. As oil prices recovered slowly during 2009, the Oil Stabilization Fund (now close to empty) was used to cover much of the remaining shortfall. Only in 2010—when oil prices were again strong—did Mexico need to issue considerably larger amounts of debt.

Since 2012, the gap between revenues and expenditures has widened, despite the tax increase in 2014, in part due to weaker economic growth and flatter non-oil tax intakes, and in part due to in-

creasing expenditures (some in the energy sector itself, where spending rose from 33 billion pesos in 2012 to 102 billion pesos in 2013).²⁸ This gap has thus far been financed with debt.

FIGURE 13: MEXICO'S GROSS DEBT



Source: IMF, World Economic Outlook Database.

Note: The large increase in the debt-to-GDP ratio from 2007 to 2008 is due more to weak GDP growth than to additional debt issuance.

A final essential distinction should be made between debt raised on market terms and debt facilitated by the U.S. government. The discussion above largely assumes that Mexico would turn to markets to issue new debt. But the U.S. government always can, in principle, save Mexico from needing to consider revenue increases or spending cuts by lending directly to the Mexican government. Past Mexican crises show how important this can be during times of intense stress. The 1982 Mexican debt crisis, which resulted from a combination of falling oil prices, rising interest rates, high indebtedness, and shrinking international reserves due to capital flight, led to Mexico declaring a moratorium on \$80 billion of foreign debt in August 1982. Throughout the lead-up and then in the aftermath, the U.S. Federal Reserve worked closely with Mexico's finance ministry to authorize a series of short-term loans, compile a rescue package, and jump-start debt renegotiations. Though the measures ultimately helped Mexico recover, they were unable to contain the crisis, which spread and became dubbed as the "lost decade" of growth for the entire Latin American region. Had the United States not intervened, the outcome would have been even worse.

Twelve years later, in December of 1994, a mix of an overvalued peso, growing dollar-denominated debt, rising U.S. interest rates, a sense of increased political risk, and steadily declining oil prices led Mexico again into financial crisis. This time the U.S. Treasury stepped in. Using preexisting authority and its economic stabilization fund, together with European countries and the IMF, it provided Mexico with \$40 billion in loans and guarantees (backed by Pemex oil export receipts). In the following years, Mexico's economy and oil prices recovered, enabling the country to balance its budget and to pay back the loans early. Once again, had the Mexican government been unable to get

direct loans from the United States, it would have been forced into severe measures to increase revenues and reduce spending. Something similar happened in the aftermath of the 2008 financial crisis as well, as the U.S. Federal Reserve established a \$30 billion swap line with the Banco de Mexico (the Mexican central bank), helping stabilize the Mexican financial system. Though not a loan that directly funded the Mexican government, it is another example of supportive U.S. intervention during a potential Mexican crisis.

RAISE REVENUES

The next option available to Mexico would be to raise revenues. Indeed, in 2009, faced with a weak budget balance due in substantial part to low oil prices, Mexico approved reforms that pushed the value-added tax (VAT) from 15 to 16 percent and raised corporate and personal income taxes (for the highest earners), among other measures.²⁹ More recently, the Mexican government has promised tax law stability, potentially limiting its options.³⁰ However, in the face of trying future circumstances, the Mexican government retains the option of reversing course.

Today, Mexico begins with a relatively low tax burden (not including duties on hydrocarbon production), at less than 20 percent of GDP in 2012. This is far below the Organization for Economic Cooperation and Development (OECD) average of closer to 35 percent and behind many of Mexico's Latin American peers, including not just Brazil but also countries such as Costa Rica and Chile.³¹

The main non-oil income generators for the government are income taxes (both personal and corporate), which combined contributed \$69 billion (33 percent of total inflows) in 2013. Next was the VAT, which provided \$42 billion, or 20 percent.³²

Recognizing its low tax intake and significant dependence upon Pemex's payments, the government of Mexican President Enrique Peña Nieto reformed Mexico's tax code in 2013. The new rules removed VAT border subsidies—where the value added tax rate had been 11 percent—standardizing the rate nationwide at 16 percent. They also raised the personal income tax on high earners and levied a 10 percent tax on dividends. The government estimates that the changes will raise revenues by 2.5 percent of GDP by 2018.³³ These increases are already incorporated in market expectations for the Mexican budget and would not be available to respond to an oil price decline. Mexico could, however, raise its tax rates further over time. Options include raising personal or corporate income tax rates, increasing the VAT and/or expanding it to cover items such as food and medicines (currently excluded), introducing an estate tax, or increasing property taxes (which are minimal). Though Mexico is careful to maintain its investor-friendly image, slight increases in some mix above could increase revenues by one or two percentage points of GDP—as with the 2013 tax reform—and still leave Mexico below the average tax rate among its Latin American peers and the OECD.

In principle, another way to close the gaps envisioned in the scenarios examined here is with better tax collection. Mexico's informal sector is estimated at over half of the active nonagricultural labor force.³⁴ This parallel economy has substantial costs not only for productivity, innovation, and economic growth, but also for public revenue. Mexico's labor secretary estimated that if the government were able to tax workers in the informal economy, it would increase revenues by 3 to 4 percent of GDP a year (roughly \$34 billion to \$46 billion).³⁵ Studies show that speeding the process, including streamlining bureaucracies, creating tax administration units focusing on micro and small taxpayers,

and lowering registration costs, would incentivize formalization.³⁶ In addition, greater use of technology could raise collection rates, for instance using mobile banking to make payments, as studies show it reduces interactions between tax officials and taxpayers “and the consequent risks of harassment, collusion, and corruption.”³⁷

The Secretary of Finance and Public Credit has stated that recent financial reforms should help reduce tax evasion, as increasing access to credit should encourage companies to formalize. Still, a recent McKinsey report draws on comparative experiences that suggest enforcement matters more than incentives in reducing informality in emerging economies.³⁸

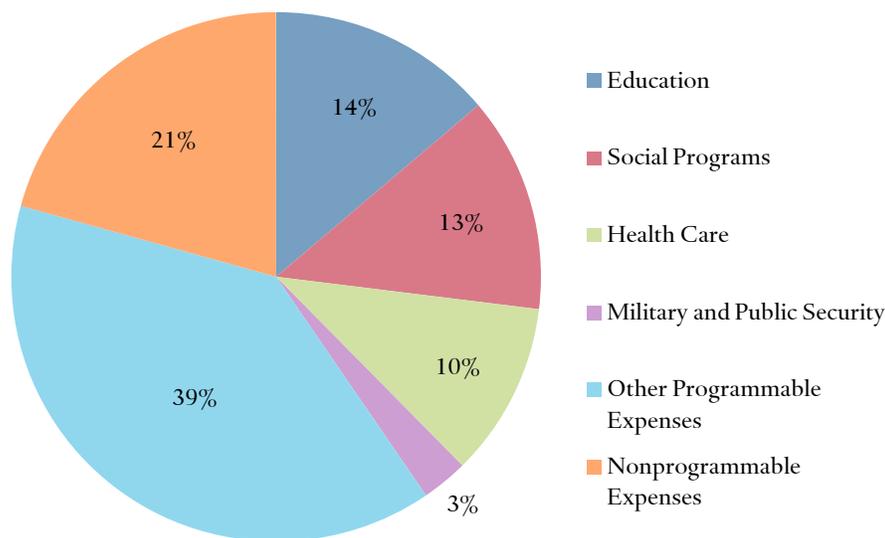
Concerted efforts to increase tax collection will, however, likely take years to show positive results. This makes them particularly ill-suited for the shorter-term scenarios modeled here. Investing in enforcement efforts beyond those already envisioned could also be difficult given the direct costs of increasing enforcement. Nonetheless, a 20 percent increase in collection of corporate and personal taxes would boost overall revenue by \$15 billion annually or 1 percent of GDP.³⁹

CUT SPENDING

The last option available to the Mexican government is to cut spending. This is perhaps the most politically difficult of the three possibilities. Cuts to programs are unpopular even in the best of times. Additionally, since a large portion of Mexico’s expenses are essentially fixed (at least unless policymakers have several years to anticipate changes), cuts would fall disproportionately on a small set of programs.

Mexico’s public-sector expenditures totaled \$319 billion in 2013, with \$253 billion for “programmable” expenses—comprising ongoing administrative and program costs—that can in principle be adjusted, and \$66 billion in “nonprogrammable” outlays—including interest payments, transfers to Mexico’s states, or debt payments—for which there is no flexibility.⁴⁰ Out of the programmable funds, some \$44 billion went to education (mostly salaries), \$42 billion to social programs, \$34 billion to health care, and \$9 billion to the military and public security, with the remaining \$124 billion disbursed among a variety of other categories.⁴¹ Over the past seven years, the fraction allocated to the various categories has remained relatively stable.

FIGURE 14: MEXICO PUBLIC-SECTOR EXPENSES, 2013



Of the programmable expenses, almost three-fourths are current expenditures—with nearly half that sum paying public employee salaries at the federal, state, and local levels. These payments, though possible to change in principle, are exceedingly difficult to adjust in practice. Public buildings need to be open and running and public sector union contracts lock in salaries and benefits. Other spending, such as for public security (roughly 5 percent of the budget), would likely be politically challenging to reduce, given the pervasive violence in many areas of the country.⁴²

The remaining quarter of the budget is devoted to long-term investments. Even more is promised in future budgets, as the Mexican government announced in early 2014 a five-year \$590 billion public-private infrastructure investment plan, with over half destined for Pemex and the Federal Electricity Commission (CFE), which operates the Mexican electricity system.⁴³ These sizable amounts are more vulnerable in tough times, as the benefits are both more opaque and accrue in the longer term. With the more abrupt revenue falls (particularly those envisioned in Scenarios 5 and 8) the Mexican government would most likely cut this discretionary spending—notably infrastructure and energy investment (comprising 29 percent of the programmable public sector budget or \$73 billion).⁴⁴ Though they would not hit Mexico's economy as directly as cutting current spending, these reductions would still harm Mexico's GDP growth by reducing economic activity in construction and other segments.

Moreover, there are limits to how deeply Mexico could cut into these items. Take Scenario 5 as a particularly stressful example. Imagine that the Mexican government balances its budget with additional debt for up to the first 1.5 percent of GDP in each year. This would leave over 2 percent of GDP to be covered through other adjustments in each of 2016 and 2017. Fully making these adjustments by reducing long-term investment would require slashing investment by as much as 30 percent or more annually. This would undercut the economic underpinnings of critical Mexican economic reforms—and, perhaps more important, threaten political support for them. Yet these are the very reforms that have been instrumental in improving international confidence in the Mexican

economy and, in particular, its sovereign debt. The Mexican government could find itself caught between a rock and hard place: unable to avoid spending cuts due to worries about accruing too much debt yet unable to slash investment expenditures due to the threat that would pose to its ability to issue debt.

In such a case, the Mexican government could be forced to curb more politically sensitive spending, including on education, social programs, and health care, which comprised nearly half of programmable expenses in 2014.⁴⁵ Much of this expenditure goes to pay the salaries of public sector workers—supported by some of Mexico’s strongest unions (for instance, the teachers’ union, which is some 1.4 million strong). Nevertheless, times of crises breed opportunities for dramatic shifts, whether in terms of renegotiating worker contracts or overhauling programs and bureaucracies. One could imagine either targeted cuts or sequester-style reductions in order to face the most difficult revenue scenarios.

With the more gradual revenue falls (notably Scenarios 6, 7, and 9), policymakers might have space to make more thoughtful adjustments through a mix of tax hikes or spending cuts. During the time before the brunt of the revenue gap develops in those scenarios, Mexico’s political parties could potentially negotiate tax increases (as they did in 2009 and 2013) or the administration could prioritize bureaucratic changes to improve tax collection. As noted earlier, the finance ministry estimates that bringing those outside into the formal (and taxable) economy would increase revenues by \$35 billion to \$47 billion, enough to cover the shortfalls projected in any of these more extreme scenarios. Though 100 percent formalization is unrealistic, some deficit relief could come from improving monitoring and collection, especially in the medium-to-long term.

In the past, Mexico might also have reduced fuel subsidies in order to free up revenue.⁴⁶ Mexico is, however, already in the process of rapidly phasing out these subsidies, which leaves little opportunity to use this option. (For the same reason, this paper does not model automatic savings from reduced subsidy costs as a result of falling oil prices.)

CROSSCUTTING ISSUES

The scenarios studied here could play out against either a strong or weak global economy. A strong global economy would give Mexico more flexibility: there would be more appetite for its debt and more ability for Mexico to absorb the broader economic consequences of tax rises or spending cuts. In addition, in a stronger economic environment, non-oil tax income would likely be increasing with GDP growth. With a weak global economy, appetite for Mexican debt could drop, though to the extent that investors were determined to hold some amount of emerging market debt, Mexico’s relative attractiveness could actually increase. At the same time, policymakers would need to worry that tax increases or spending cuts might aggravate recessionary tendencies, leading to a vicious cycle of falling tax intakes and increasing demand for public social programs. They would face this challenge in an environment in which their tax collections from the rest of the economy were below expectations too.

MEXICO'S ENERGY REFORM

In December 2013, the Mexican Congress passed a historic reform to end Pemex's longstanding monopoly, opening up the country's energy sector to private investment (both foreign and domestic) in exploration and development, as well as in refining, transport, storage, and distribution of oil, petroleum products, and natural gas. How might this affect the analysis here?

Pemex will evolve from a state-owned enterprise to a "state-productive enterprise," setting it up to compete with national and international energy companies in Mexico and potentially worldwide. In August 2014, the Mexican Congress passed secondary legislation to set the contractual framework for transparency, private-sector participation, and domestic content requirements among many other issues. As part of the reform process, Pemex submitted requests to retain control over 83 percent of proven and probable reserves and less of the country's unconventional resources—for instance, only 15 percent of shale fields. Mexico's National Hydrocarbon Commission (CNH) approved Pemex's petition for proven and probable reserves, but only granted it two-thirds of its request for Mexico's prospective reserves (21 percent of the country's total prospective reserves).⁴⁷ With Pemex's portfolio confirmed and this legislation setting the basic rules of the game for the sector, it can now be open to foreign investment, either on its own or in partnership with Pemex. The government expects the first auctions to begin in 2015 and to take place once a year.

If successful, the reform will restructure Mexico's energy sector and its role in public finances, ultimately altering some of the risks explored here. In the wake of the reform, the current revenue arrangements between Pemex and the Mexican government will change. In 2013, the Mexican government took 99 cents of every one of Pemex's pretax dollars, essentially pouring all its earnings back into the Mexican Treasury.⁴⁸ Additionally, all of Pemex's spending and investment decisions need to be approved by the Secretary of Finance and Public Credit. With the reform's implementation, the company will gain much more investment and operating autonomy, moving toward more equal treatment with its potential foreign and domestic company counterparts.

Though more favorable tax conditions are needed to attract private investment, the Mexican government will likely continue to take a sizable share of oil profits. Mexican officials have noted (or "pointed to") the tax regimes of other oil-rich countries while calling for reform. For example, President Peña Nieto's proposal noted that the Norwegian government's take is 78 percent of oil producers' net profit and the Colombian government's share is 75 percent, while the finance minister said a government share above 50 percent would be "reasonable."⁴⁹ After the secondary legislation was passed in August 2014, it appears that Pemex's fiscal regime will be simplified and the tax burden slowly reduced over the next five years, decreasing from 71.5 percent to 65 percent.⁵⁰

Still, these changes will occur slowly over the next decade.⁵¹ And in the long run the effects of the reforms on tax revenues are ambiguous: though the percentage received from each barrel of oil will decline, a successful reform could increase oil production, broadening the taxable base that is vulnerable to oil price shocks. Many experts believe energy (and electricity reform) has the potential to boost other sectors of the economy, in particular manufacturing, which would increase non-oil tax revenues, reducing public dependence in the long term.⁵²

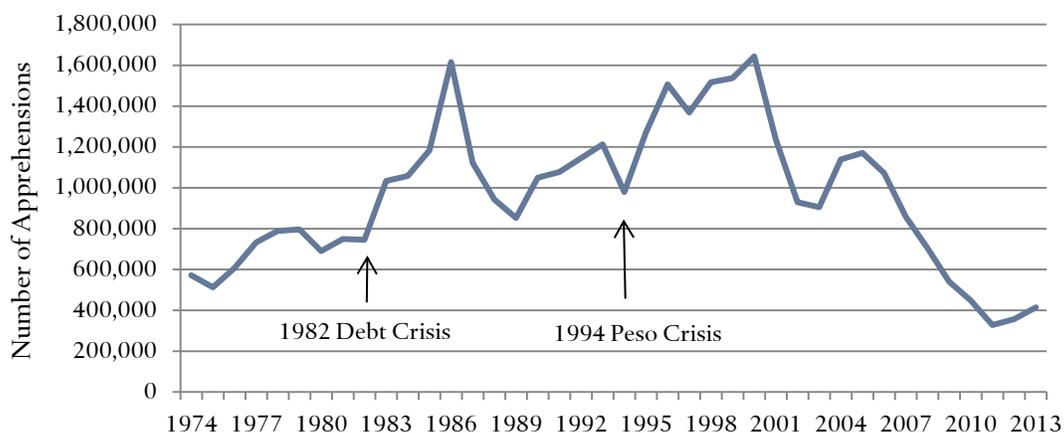
Consequences for the United States

The worst-case scenarios could have strong reverberations for the United States, particularly if coupled with a slow Mexican economy and a weak initial U.S. response.

Trade with Mexico is significant and, even if a recession there does not hit aggregate GDP strongly, it would hurt particular U.S. companies, workers, and their communities. The total value of exports to Mexico was \$256 billion in 2013.⁵³ Estimates for the number of U.S. jobs that depend on exports to Mexico range from 1.1 million to 6 million.⁵⁴ A significant reduction in demand from Mexican households and businesses for American products would be especially damaging to the machinery, electrical machinery, vehicles, plastics, and agricultural products industries, each of which had exports to Mexico valued at over \$15 billion in 2013.⁵⁵ Reduced sales in Mexico could lead to layoffs of American workers and have a negative multiplier effect on their communities.

An economic downturn in Mexico could also spur immigration to the United States. There are many factors behind the movement of people, but one is economic, including the differences in wages and opportunities. In the wake of Mexico's past economic crises, there were large influxes, particularly of undocumented immigrants crossing the U.S. southern border (as shown in Figure 15). In the scenarios studied here, this could be compounded by constraints on the Mexican government's ability to spend on social services, or by fiscal pressure to hike taxes that might perversely weaken the Mexican economy in the short term. Large issuances of debt could also crowd out financing for Mexican businesses, with broader economic consequences.

FIGURE 15: U.S. SOUTHWEST BORDER SECTOR APPREHENSIONS



Source: U.S. Customs and Border Protection, Total Illegal Alien Apprehensions, Southwest Border Sectors.

Another potential area for bilateral concern would be on the security front. President Peña Nieto has pursued a security policy focused on reducing the high levels of violence experienced across the country during the previous administration. Although the homicide rate has fallen somewhat to 19 homicides per 100,000 people in 2013 from its peak of 23 in 2011, it remains almost 2.5 times larger

than that of 2007.⁵⁶ And other crimes—including kidnapping, extortion, and robbery—have continued to climb. Much of the violence is attributed to increasingly sophisticated and powerful criminal and drug-trafficking organizations. Some of the most prominent drug-trafficking cartels, including the Sinaloa Cartel, Los Zetas, and the Familia Michoacana, have been somewhat weakened by the decapitation of top leadership, leading to geographic shifts in violence. Still, other organized crime groups have taken their place and Mexico continues to struggle in its efforts to establish a widespread and robust democratic rule of law.

Though even in a tight budget scenario Mexico would be unlikely to cut security spending, it would become more politically difficult to substantially increase outlays. Yet Mexico has acknowledged that it needs to invest more, in particular to revamp its police forces and court systems to take on criminal organizations that extend throughout North America and beyond, and to strengthen its rule of law more generally.

Pressure on government finances could also affect the bilateral relationship more diffusely. Faced with a need to make tough tradeoffs involved in raising revenues or cutting spending, Mexican policymakers might be less capable politically of working with their U.S. counterparts on other priority issues such as border infrastructure investment and cooperation on regional security. As \$1.4 billion in goods cross the U.S.-Mexico border every day, the average land port of entry is over forty years old.⁵⁷ Overwhelmed crossings and lengthy security checks mean it can take hours to cross the border.⁵⁸ These delays cost companies billions of dollars and deter the deepening of the cross-border production and supply chains that help ensure that North America based firms are globally competitive.

Cooperation is also necessary for the two countries to be able to deal with the array of regional security challenges they currently face, including the recent wave of migrants from Central America. Drug traffickers and other criminal organizations penetrate not just Mexico, but also, and perhaps to a greater degree, its Central American neighbors. Given the transnational nature of these threats, regional solutions—involving the United States, Mexico, and Central American nations, along with other interested parties, will be necessary. In this, as in so many other issues, Mexico's economic health and standing will influence its role and commitment.

U.S. Policy Implications

The scenario analysis in this paper reveals that though a large oil price shock would be required to cause severe stress to the Mexican government—a result in large part of important reforms executed over the last twenty years—such a predicament cannot be excluded. What should U.S. policymakers do knowing this? Much of what this paper explores is beyond the control or influence of the U.S. government. The United States cannot control oil prices or alter Mexican government budgeting. There are three places, however, where the U.S. officials could promote valuable reforms.

EXPAND IMF STRESS TESTS

As part of its annual consultation with Mexico, the IMF performs a series of stress tests to assess vulnerabilities and risk related to public-sector debt in order to inform policymakers. These stress tests are shocks to GDP growth, primary balance (i.e. the government budget deficit), interest rate, and a combined macro-fiscal shock.⁵⁹ The United States should encourage the IMF to add oil price shocks to this battery.

In 2013, IMF staff modeled a shock to Mexico's primary balance that topped out at 2.2 percent of GDP in a single year and, cumulatively, totaled 4.3 percent of GDP. Most of the scenarios explored here (4–9) entail equal or greater cumulative budget shortfalls, while three of them (5, 8, and 9) also approach that in one-year deficits. The impact of an oil price shock would also be felt through Mexican GDP and the value of the peso; depending on the drivers behind the oil price shock, a shift in interest rates could occur simultaneously too. Although analysis of these many factors is beyond the scope of this paper, it could be straightforwardly included by IMF economists. This would help Mexican and other policymakers better gauge risks to Mexico and potential spillovers. Such a model could also be profitably applied to other countries in which oil and gas revenues play a large role in public finances.

PREPARE TO OFFER GOVERNMENT-TO-GOVERNMENT LOANS

Severe stress to the Mexican government could push Mexico to shift revenue and spending policies in ways that hurt the United States. Experience indicates that direct U.S. government loans can sometimes be the only way to avoid that. The same history, though, shows that such loans can be politically difficult and can require using existing authorities rather than acquiring new ones from Congress. The United States needs a framework by which it could offer Mexico loans quickly and unencumbered. The U.S. Treasury still maintains the Exchange Stabilization Fund, which was used in 1995 to provide the liquidity needed to stabilize Mexico's fiscal accounts. This should be maintained for use either alone or in conjunction with the IMF or other international financial institutions.

The United States should also learn from the 2008–2009 financial crisis experience that early intervention can be more effective than stepping in after the Mexican economy has already suffered severely. In the 2008–2009 crisis, unlike in 1982 and 1994–95, the U.S. government extended help

preemptively, making its intervention more effective and less costly.⁶⁰ To be certain, acting early can also be wasteful, if it turns out that assistance was not actually needed; moreover, Mexican politics may make early action unattractive or impossible. Still, having contingency plans makes early action more feasible if desired.

HELP MEXICO BOOST ITS NON-OIL ECONOMY

More broadly, the United States and Mexico can work together to lower the costs of trade and improve the productivity of the non-oil sectors of Mexico's economy—namely manufacturing and services. This will reduce the government's vulnerability to oil shocks and also benefit U.S. and other companies with operations in both countries.

In the twenty years since the North American Free Trade Agreement (NAFTA), the U.S. and Mexican economies have become increasingly integrated as a production platform. This has benefitted both economies by making them more globally competitive. Still, a range of impediments increase transaction costs for producers and slow trade.

Divergent rules impede joint production, hurting both the U.S. and Mexican economies. Some regulations are vastly different and progress toward mutual recognition, equivalence, or harmonization is unlikely. But for others, such as label sizes, the variances are fairly trivial.⁶¹ Increasing the harmonization or mutual recognition of regulations and consumer product tests would lower operational costs for companies producing on both sides of the border and bolster Mexico's non-oil economy and tax base.

In addition, as the volume of people, cars, trucks, and goods crossing the U.S.-Mexico border escalated in the last twenty years, border infrastructure investment lagged, increasing border-crossing times. The delays reduce the natural comparative advantage that Mexican firms have due to their geographic proximity to the United States, elevating costs for workers, companies, and border cities.⁶² The U.S. Department of Transportation estimates a \$10 billion infrastructure deficit along the border.⁶³ Even when investments occur on one side of the border, they at times lack reciprocal and complementary attention on the other side, limiting potential trade gains. Greater and coordinated investments would strengthen the competitiveness of U.S. and Mexican companies, providing economic benefits on both sides of the border.

The United States can also revamp and streamline its bureaucratic processes. Initiatives such as the Customs-Trade Partnership Against Terrorism (C-TPAT), Secure Electronic Network for Travelers Rapid Inspection (SENTRI), Global Entry, and Free and Secure Trade (FAST) lanes help speed the movement of goods and people by separating trusted travelers and shippers from those less known. These now proven programs could be expanded. The United States can and should also work with Mexico to create a single window and electronic customs system—simplifying customs paperwork and eliminating multiple filings—to streamline regional commerce.

The combination of mutually recognized regulations, border infrastructure investment, and less paperwork would strengthen the competitiveness of Mexico's non-oil sectors. With a stronger and more diversified economic base, Mexico's vulnerability to an oil shock would be reduced.

Conclusion

The majority of the scenarios modeled here reveal that Mexico is capable of handling substantial oil price volatility. It would take large and sustained oil price shocks, as is the case in Scenarios 5 and 8, to severely stress the government budget. This in turn could hurt the U.S. economy and security, and weaken ties between the two countries. Mexico has options to cope with significant shortfalls in oil revenues: it can increase debt, raise non-oil revenues, or cut spending. The United States can help reduce the impact in the most difficult scenarios.

Though the most stressful scenarios are also the least likely to occur—and all go well beyond what happened as oil prices declined in the second half of 2014—they are plausible enough that Mexico and the United States should take steps to prepare. These should include expanding IMF stress tests, being ready to offer government-to-government loans, and helping Mexico grow the non-oil sectors of its economy.

In U.S. policy planning, political disruptions within Middle East energy partners, such as Saudi Arabia, typically receive the most attention. This analysis demonstrates the importance of evaluating risks associated with other oil-dependent countries linked economically and politically to the United States.

Appendix

Under its current fiscal regime, Pemex pays the government through a number of federal taxes and duties, which are outlined in Mexico's Federal Duties Law and the Federal Revenues Law. After secondary legislation for the energy reform was passed in August 2014, it appears that Pemex's fiscal regime will be simplified and slowly reduced over the next five years, with the tax burden gradually decreasing from 71.5 percent to 65 percent, in theory.⁶⁴

Currently, the main federal duties are assessed based on the value of oil and natural gas that is extracted every year. Pemex–Exploration and Production (Pemex–E and P), the upstream oil and natural gas segment of Pemex, produces the vast majority of oil and natural gas in Mexico and is thus subject these duties.⁶⁵ Other segments of the company (Pemex–Refining, Pemex–Gas and Basic Petrochemicals, and Pemex–Petrochemicals) are subject to other taxes, but these contributions make up a minimal portion of Pemex's total payments. Our analysis therefore focuses on Pemex–E and P's fiscal regime (referred to as “Pemex” in the subsequent analysis), which is a number of annual duties based on hydrocarbon production.

Using 2011 Pemex production data and information from the Mexican Federal Duties Law, we build a simple spreadsheet model that quantifies how Pemex's annual duties are assessed. Pemex's duties are primarily based on the value of hydrocarbons production. Production value is determined by four main factors: the volume of oil and natural gas produced; the volume of exported crude oil; the budgeted crude oil price (as determined by legislators); and the average crude oil export price (largely tracking the market). In recent years, Mexico's production has held relatively constant, even declining. Pemex also exports roughly half of the crude oil it produces (the other half is consumed by domestic refineries), making crude exports an important revenue generator.

The large proportion of exports means that a substantial amount of Mexico's oil production is exposed, potentially vulnerable to price swings. The government attempts to insulate its oil export revenue from adverse price volatility by hedging some of its exports.⁶⁶ By purchasing put options, which give Pemex the right—but not the obligation—to receive a predetermined amount of money should prices drop below a certain threshold, hedging has the potential to help the Mexican government stave off negative effects from future price shocks.⁶⁷

We incorporated all of these factors into our analysis and compared our model's output to the published figures of Pemex 2011 and 2012 duties to confirm the model's accuracy. The model also confirmed that oil (rather than gas) production is the main driver of Pemex's payments. We therefore neglected natural gas in our broader analysis.

Pemex duties are calculated using a “budgeted oil price” set by the Mexican Congress. We assumed an actual oil price of \$100 per barrel for reference, and we estimated annual budgeted oil prices to 2020 as 90 percent of the previous year's export price, based on the historical relationship between annual budgeted oil prices and export prices, with the exception of 2015, for which we set the budgeted oil price at \$79, as has been publicly reported.⁶⁸ We assumed constant oil production to 2020, based on the EIA's September 2014 *International Energy Outlook* (Reference Case).

We also modeled possible Mexican government adjustments to Pemex taxation in response to oil price shocks. In principle, the Mexican government could blunt any revenue drop by raising its budgeted oil price (which would in turn raise Pemex's duties). Even if the Mexican government reacted to an oil price shock by raising the budgeted oil price in the later years of the shock to 100 percent of the actual oil price, the results for Mexican public finances do not substantially change.

About the Authors

Michael A. Levi is the David M. Rubenstein senior fellow for energy and the environment at the Council on Foreign Relations (CFR), director of the Maurice R. Greenberg Center for Geoeconomic Studies, and director of the CFR program on energy security and climate change. He is the author of *The Power Surge: Energy, Opportunity, and the Battle of America's Future* and *By All Means Necessary: How China's Resource Quest is Changing the World* (with Elizabeth Economy).

Alexandra Mahler-Haug is a research analyst at NewWorld Capital Group, LLC. Prior to joining NewWorld, Mahler-Haug was a research associate for energy and national security at CFR. She also worked for the House of Representatives subcommittee on national security and foreign affairs, and the Senate subcommittee on contracting oversight. She received her BA from Dartmouth College.

Shannon K. O'Neil is senior fellow for Latin America studies at CFR. She is the author of *Two Nations Indivisible: Mexico, the United States, and the Road Ahead* (Oxford University Press, 2013), and also directed two CFR-sponsored Independent Task Force Reports, *North America: Time for a New Focus* and *U.S.-Latin America Relations: A New Direction for a New Reality*. Her blog, *Latin America's Moment*, analyzes developments in Latin America and U.S. relations in the region.

Endnotes

-
1. This is calculated by using total hydrocarbon taxes as a percentage of total income. Secretaría de Hacienda y Crédito Público, “Estadísticas Oportunas de Finanzas Públicas: Sector Público,” accessed June 16, 2014, http://www.hacienda.gob.mx/POLITICAFINANCIERA/FINANZASPUBLICAS/Estadisticas_Oportunas_Finanzas_Publicas/Informacion_mensual/Paginas/ingresos_gasto_financiamiento.aspx.
 2. The long-term importance of energy based taxes will depend whether the reforms spur oil and gas production enough to offset lower tax rates.
 3. International Monetary Fund, “Mexico: Staff Report for the 2013 Article IV Consultation,” <https://www.imf.org/external/pubs/ft/scr/2013/cr13334.pdf>.
 4. World Bank, “Fuel Exports (% of Merchandise Exports),” accessed September 30, 2013, <http://data.worldbank.org/indicator/TX.VAL.FUEL.ZS.UN?page=6>; World Bank, “Oil rents (% of GDP),” accessed June 2, 2014, <http://data.worldbank.org/indicator/NY.GDP.PETR.RT.ZS>.
 5. World Bank, “Fuel Exports (% of Merchandise Exports),” accessed May 27, 2014, <http://data.worldbank.org/indicator/TX.VAL.FUEL.ZS.UN>; World Bank, “Manufacture Exports (% of Merchandise Exports),” accessed May 27, 2014, <http://data.worldbank.org/indicator/TX.VAL.MANF.ZS.UN>.
 6. Pemex, “Audited Financial Results of Petróleos Mexicanos,” May 2, 2013, http://www.ri.pemex.com/files/content/Reporte_2012A_i_130503.pdf.
 7. Adrian Lajous, “Mexican Energy Reform,” Columbia SIPA, June 2014.
 8. In 2013, Pemex’s total sales were over \$122 billion. After subtracting \$62 billion in sales costs (defined as everything from exploration expenses to workers’ wages, petrochemical and gas imports to drilling platforms), and factoring in additional revenues and expenses Pemex was left with 55,671 million U.S. dollars in pre-tax revenue. Pemex, “Financial Results of Petróleos Mexicanos,” February 27, 2014, http://www.ri.pemex.com/files/content/Report_4Q13_140312.pdf; Cámara de Diputados del H. Congreso de la Unión, “Ley de Ingresos de la Federación para el Ejercicio Fiscal de 2009,” October 11, 2008, http://www.oas.org/juridico/spanish/mesicic3_mex_anexo3.pdf; Pemex, “Audited Financial Results of Petróleos Mexicanos,” May 2, 2013, http://www.ri.pemex.com/files/content/Reporte_2012A_i_130503.pdf.
 9. The value of Pemex’s production depends on volume produced, exports, the price of exports, and the budgeted crude oil price.
 10. The Hydrocarbons Duty for the Stabilization Fund levies a 1 percent to 10 percent tax whenever the export price for oil is over \$22, with the maximum rate of 10 percent applying if the price of oil exceeds \$31 a barrel. The international price of oil has not dipped below \$31 in the past decade.
 11. International Monetary Fund, “Mexico: Selected Issues,” November 2013, p.5, <http://www.imf.org/external/pubs/ft/scr/2013/cr13333.pdf>.
 12. Cámara de Diputados, “El Régimen Fiscal de PEMEX,” June 2009 <http://www.diputados.gob.mx/sedia/sia/se/SE-ISS-27-09.pdf>; “Diario Oficial,” Secretaría de Hacienda y Crédito Público, March 29, 2013, http://www.shcp.gob.mx/Estados/Participaciones/calculo_mensual/2013/febrero_2013_rfp_y_part_29mar2013.pdf; Pemex, “Presentación a Inversionistas,” August 2013, http://www.ri.pemex.com/files/content/Pemex_Outlook_e_130808.pdf.
 13. U.S. Energy Information Administration, “International Energy Outlook 2014,” September 2014, p. 32, [http://www.eia.gov/forecasts/ieo/pdf/0484\(2014\).pdf](http://www.eia.gov/forecasts/ieo/pdf/0484(2014).pdf); Adriana Barrera and David Alire Garcia, “Shell says most focused on deep water oil projects in Mexico,” Reuters, November 11, 2014, <http://www.reuters.com/article/2014/11/11/us-mexico-reforms-shell-idUSKCN0IV28720141111>.
 14. International Monetary Fund, “World Economic Outlook Database,” accessed July 16, 2014, <http://www.imf.org/external/pubs/ft/weo/2014/01/weodata/index.aspx>.
 15. US EIA AEO 2014 reference case has Brent at \$100/bbl in 2020. U.S. Energy Information Administration, “AEO2014 Early Release Overview,” 2014, [http://www.eia.gov/forecasts/aeo/er/pdf/0383er\(2014\).pdf](http://www.eia.gov/forecasts/aeo/er/pdf/0383er(2014).pdf).
 16. Ajay Malkan, “Mexico hedges oil output at highest price on record,” *Financial Times*, September 18, 2013, <http://www.ft.com/intl/cms/s/0/ec038a60-206b-11e3-9a9a-00144feab7de.html>.

17. U.S. Energy Information Administration, "AEO2014 Early Release Overview," 2014, [http://www.eia.gov/forecasts/aeo/er/pdf/0383er\(2014\).pdf](http://www.eia.gov/forecasts/aeo/er/pdf/0383er(2014).pdf).
18. Secretaría de Hacienda y Crédito Público, "Public Sector Financial Requirements, Public Sector Borrowing Requirements," http://www.hacienda.gob.mx/English/Timely_Public_Finances/Quarterly_Information/Paginas/public_sector.aspx.
19. Santiago García-Verdú and Miguel Zerecero, "On central bank interventions in the Mexican peso/dollar foreign exchange market," Bank for International Settlements Working Paper no. 429, September 2013.
20. Standard and Poor's, "Sovereign Ratings List," accessed June 16, 2014, <http://www.standardandpoors.com/ratings/sovereigns/ratings-list/en/us?sectorName=null&subSectorCode=39>.
21. Richard W. Fisher, "Remarks Before the Association of Mexican Banks," Federal Reserve Bank of Dallas, March 5, 2014, <http://www.dallasfed.org/news/speeches/fisher/2014/fs140305.cfm>.
22. International Monetary Fund, "IMF Executive Board Completes Review of Mexico's Performance under the Flexible Credit Line," November 26, 2013, <http://www.imf.org/external/np/sec/pr/2013/pr13474.htm>.
23. International Monetary Fund, "World Economic Outlook Database," April 2014. These numbers are gross debt.
24. This number differs from that of the Mexican government, as the IMF calculations include obligations not part of the official public balance sheet, such as PIDIREGAS debt, gross IPAB debt, Debtor's support programs debt, FONDAIN debt, and other public sector liabilities. Excluding these responsibilities, Mexico's gross debt to GDP ratio is 36.3 percent. International Monetary Fund, "World Economic Outlook Database," accessed July 16, 2014.
25. These numbers are gross debt. International Monetary Fund, "Staff Report for the 2013 Article IV Consultation, Public Debt Sustainability Analysis," November 2013, p. 2, <http://www.imf.org/external/pubs/ft/scr/2013/cr13334.pdf>.
26. Secretaría de Hacienda y Crédito Público "Saldo Totales de las Obligaciones Financieras de Entidades Federativas y Municipios," http://www.hacienda.gob.mx/Estados/Deuda_Publica_EFM/2014/Paginas/1erTrimestre.aspx.
27. Year-on-year change in federal government debt from 2007–2008 was an amount equivalent to 3.68 percent of GDP. Secretaría de Hacienda y Crédito Público, "Estadísticas Oportunas de Finanzas Públicas: Dueda Pública," http://www.hacienda.gob.mx/POLITICAFINANCIERA/FINANZASPUBLICAS/Estadisticas_Oportunas_Finanzas_Publicas/Informacion_mensual/Paginas/deuda_publica.aspx; Secretaría de Hacienda y Crédito Público, "Annual Borrowing Plan 2013."
28. Secretaría de Hacienda y Crédito Público, "Gasto programable del sector público presupuestario," http://www.hacienda.gob.mx/POLITICAFINANCIERA/FINANZASPUBLICAS/Estadisticas_Oportunas_Finanzas_Publicas/Informacion_mensual/Paginas/ingresos_gasto_financiamiento.aspx.
29. The tax increases were stipulated for the 2010 to 2012 period. Organization for Economic Cooperation and Development, "Country Notes: Mexico," 2011.
30. The authors thank an anonymous reviewer for this observation.
31. OECD, "Revenue Statistics in Latin America: 1990–2010," http://www.oecd.org/ctp/tax-global/Brazil%20country%20note_EN_final.pdf.
32. Secretaría de Hacienda y Crédito Público, "Estadísticas Oportunas de Finanzas Públicas: Sector Público," accessed June 16, 2014, http://www.hacienda.gob.mx/POLITICAFINANCIERA/FINANZASPUBLICAS/Estadisticas_Oportunas_Finanzas_Publicas/Informacion_mensual/Paginas/ingresos_gasto_financiamiento.aspx.
33. Alexandra Alper, "Mexico Has Scope for Further Fiscal Reform: S&P," *Reuters*, November 9, 2013, <http://www.reuters.com/article/2013/11/09/mexico-rating-idUSL2N0IU0IL20131109>.
34. Eduardo Bolio, Jaana Remes, et. al., "A Tale of Two Mexicos: Growth and Prosperity in a Two-Speed Economy," McKinsey Global Institute, March 2014, http://www.mckinsey.com/insights/americas/a_tale_of_two_mexicos.
35. Krista Hughes, "Mexico Aims to Bring Shadow Economy into the Light," *Reuters*, June 26, 2013, <http://www.reuters.com/article/2013/06/26/us-mexico-economy-informal-idUSBRE95P09C20130626>; OECD, StatExtracts "Gross Domestic Product," http://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE1.
36. Anuradha Joshi, Wilson Prichard, and Christopher Heady, "Taxing the Informal Economy: Challenges, Possibilities, and Remaining Questions," Institute of Development Studies, August 2013, <http://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/2876/Wp429.pdf;jsessionid=6997C003D0994A639386F1F33CC7F88D?sequence=1>.
37. Joshi, Prichard, and Heady.
38. Bolio, Remes, et. al.
39. OECD, "Tax Policy Analysis: Revenue Statistics Country Note for Mexico," <http://www.oecd.org/ctp/tax-policy/revenue-statistics-country-note-for-mexico.htm>.
40. The public sector includes both the federal government as well as state-owned companies such as Pemex. Secretaría de Hacienda y Crédito Público, "Estadísticas Oportunas de Finanzas Públicas: Sector Público," accessed June 16, 2014, http://www.hacienda.gob.mx/POLITICAFINANCIERA/FINANZASPUBLICAS/Estadisticas_Oportunas_Finanzas_Publicas/Informacion_mensual/Paginas/ingresos_gasto_financiamiento.aspx.
41. Ibid.

42. Presupuesto de Egresos De La Federación, “Presupuesto Ciudadano,” 2013, <http://www.hacienda.gob.mx/EGRESOS/Presupuesto%20Ciudadano/Presupuesto%20Ciudadano%202013%20Final.pdf>.
43. Anthony Harrup, “Mexican Government Boosts Infrastructure Investment Plan,” *Wall Street Journal*, April 28, 2014, <http://online.wsj.com/news/articles/SB10001424052702304163604579530131171053254>.
44. Secretaría de Hacienda y Crédito Público, “Estadísticas Oportunas de Finanzas Públicas: Sector Público,” accessed June 16, 2014, http://www.hacienda.gob.mx/POLITICAFINANCIERA/FINANZASPUBLICAS/Estadisticas_Oportunas_Finanzas_Publicas/Informacion_mensual/Paginas/ingresos_gasto_financiamiento.aspx.
45. Transparencia Presupuestaria: Observatorio del gasto, “Proyecto de presupuesto de egresos de la federación,” <http://www.transparenciapresupuestaria.gob.mx/ptp/ServletImagen?tipo=pdf&idDoc=933>.
46. Mayer Brown, “Analysis of Mexico’s New Hydrocarbons Legal Regime, August 14, 2014, <http://www.mayerbrown.com/files/Publication/69fe7acd-ca5b-4d1c-a172-31678b13ec06/Presentation/PublicationAttachment/75b0fe83-d4a2-4523-b8e2-3f7ae78102a7/UPDATE-Analysis-of-Mexico's-New-Hydrocarbons-Legal-Regime.pdf>; Secretaría de Hacienda y Crédito Público, “Diario Oficial de la Federación,” last modified November 8th, 2014, http://www.dof.gob.mx/nota_detalle.php?codigo=5355989&fecha=11/08/2014.
47. David L. Goldwyn, Neil R. Brown, and Megan Reilly Cayten, “Mexico’s Energy Reform: Ready to Launch,” Atlantic Council Adrienne Arsht Latin America Center, August 2014, http://www.atlanticcouncil.org/images/files/MexEnRefReadytoLaunch_FINAL_8.25._1230pm_launch.pdf.
48. PEMEX, “Unaudited Financial Results Report,” 2013.
49. David Alire Garcia, “Mexico to Keep Pumping Pemex for Tax Money Despite Promised Reforms,” *Reuters*, October 20, 2013, <http://www.reuters.com/article/2013/10/30/mexico-reforms-pemex-idUSL1N0IB00I20131030>.
50. SCHP Minister Luis Videgaray, as quoted in: Pedro Alcalá, “Secondary Laws: Impact and Ramifications,” *Mexico Oil and Gas Energy Forum*, August 12, 2014, <http://www.oilandgasmexico.com/2014/08/12/secondary-laws-impact-ramifications/>. Also described on the Secretary of Energy website: Secretaría de Energía, “Public Finances, Fiscal Regime,” accessed September 2014, http://www.energia.gob.mx/webSener/leyes_secundarias_ing/9222.html. Also see Pemex, “Mexico’s Energy Reform & PEMEX as a State Productive Enterprise,” Presentation, August 2014, page 19, http://ri.pemex.com/files/content/PEMEX%20SPE_i_140922_VF_sa.pdf. However, “elsewhere in the reformed laws, the Ministry of Finance retains the right to adjust tax rates to ensure sufficient revenue for public expenditures”, as described in: Diana Villiers Negroponte, “Mexico’s Energy Reforms Become Law,” Brookings Institution, August 14, 2014, <http://www.brookings.edu/research/articles/2014/08/14-mexico-energy-law-negroponte>.
51. See, for example, new report from Center on Global Energy Policy (June 2014): Adrian Lajous, “Mexican Energy Reform,” Center on Global Energy Policy, Columbia University/SIPA, June 2014, and Alejandra Lopez, “Dejarán de exprimir Pemex ¡hasta 2026!,” *Reforma*, April 26, 2014, www.negociosreforma.com/libre/acceso/acceso.shtm?urlredirect=/aplicaciones/articulo/default.aspx?id=215197&v=4.
52. “Mexico’s Cross-Party Energy Reform Proposal,” *Reuters*, December 7, 2013, <http://www.reuters.com/article/2013/12/08/us-mexico-reforms-factbox-idUSBRE9B700520131208>.
53. Gary Clyde Hufbauer, Cathleen Cimino, and Tyler Moran, “NAFTA at 20: Misleading Charges and Positive Achievements,” Peterson Institute for International Economics, May 2014, <http://www.piie.com/publications/pb/pb14-13.pdf>; Corroborated by OECD statistics which puts total commodity exports in 2013 at 226 and services at 27.7 for a total of 254.
54. International Trade Administration, “Jobs Supported by Export Destination, 2013,” Preliminary release, updated June 2014, http://www.trade.gov/mas/ian/build/groups/public/@tg_ian/documents/webcontent/tg_ian_005373.pdf; Christopher E. Wilson, “Working Together: Economic Ties Between the United States and Mexico,” Woodrow Wilson International Center for Scholars, November 2011, <http://www.wilsoncenter.org/sites/default/files/Working%20Together%20Full%20Document.pdf>; Hufbauer, Cimino, and Moran.
55. Office of the United States Trade Representative, “Mexico,” last modified May 1, 2014, <http://www.ustr.gov/countries-regions/americas/Mexico>.
56. United Nations Office on Drugs and Crime, “Global Study on Homicide, UNODC Homicide Statistics 2013,” <http://www.unodc.org/gsh/en/data.html>; Anthony Harrup, “Mexican Homicide Rate Fell 12.5% in 2013, Statistics Agency Says,” *Wall Street Journal*, July 24, 2014, <http://online.wsj.com/articles/mexican-homicide-rate-fell-12-5-in-2013-statistics-agency-says-1406155624>.
57. Mikhail Pavlov, “Meeting Land Port of Entry Modernization Needs in Constrained Budgetary Environment,” presentation to the Joint Working Committee, Customs and Border Protection, Department of Homeland Security, March 14–15, 2012, p. 3.
58. U.S. Government Accountability Office, “CBP Action Needed to Improve Wait Time Data and Measure Outcomes of Trade Facilitation Efforts,” GAO-13-603, July 2013, <http://www.gao.gov/assets/660/656140.pdf>; Erik Lee, Christopher E. Wilson, et al., “The State of the Border Report,” Woodrow Wilson Mexico Institute, El Colegio de la Frontera Norte, and the North American Center for Transborder Studies, May 2013 http://www.wilsoncenter.org/sites/default/files/mexico_state_of_border_0.pdf; Amanda J. Crawford, “Border Delays Cost U.S. \$7.8 Billion as Fence is Focus,” *Bloomberg News*, May 14, 2013, <http://www.bloomberg.com/news/2013-05-15/border-delays-cost-u-s-7-8-billion-as-fence-is-focus.html>.

59. For full details about the stress tests, please see International Monetary Fund, “Staff Report for the 2013 Article IV Consultation, Public Debt Sustainability Analysis,” November 2013, p. 4.
60. The authors thank an anonymous reviewer for this observation.
61. Robert Pastor, *The North American Idea: A Vision of a Continental Future* (New York: Oxford University Press, 2011), p. 135.
62. U.S. Government Accountability Office, “CBP Action Needed to Improve Wait Time Data and Measure Outcomes of Trade Facilitation Efforts,” GAO-13-603, July 2013, <http://www.gao.gov/assets/660/656140.pdf>; Erik Lee, Christopher E. Wilson, et al.
63. U.S. Department of Transportation, “Deputy Secretary Mendez-North America Sustainable Development Summit,” August 26, 2014, <http://www.dot.gov/briefing-room/deputy-secretary-mendez-north-american-sustainable-economic-development-summit>.
64. SCHP Minister Luis Videgaray, as quoted in: Pedro Alcalá, “Secondary Laws: Impact and Ramifications,” *Mexico Oil and Gas Technology Forum*, August 12, 2014, <http://www.oilandgasmexico.com/2014/08/12/secondary-laws-impact-ramifications/>. Also described on the Secretary of Energy website: Secretaría de Energía, “Public Finances, Fiscal Regime,” accessed September 2014, http://www.energia.gob.mx/webSener/leyes_secundarias_ing/9222.html. Also see Pemex, “Mexico’s Energy Reform & PEMEX as a State Productive Enterprise,” Presentation, August 2014, page 19. However, “elsewhere in the reformed laws, the Ministry of Finance retains the right to adjust tax rates to ensure sufficient revenue for public expenditures”, as described in: Diana Villiers Negroponete, “Mexico’s Energy Reforms Become Law.”
65. “Under the current fiscal regime, Pemex–Exploration and Production is governed by the *Ley Federal de Derechos* (Federal Duties Law), while the other subsidiary entities are governed by the *Ley de Ingresos de la Federación* (Federal Revenue Law) for the applicable fiscal year.” PEMEX, “Form 20-F Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 for the fiscal year ended December 31, 2012,” May 2013, p. 94, <http://www.sec.gov/Archives/edgar/data/932782/000119312513187870/d528399d20f.htm>. Other segments and subsidiaries (Pemex–Refining, Pemex–Gas and Basic Petrochemicals and Pemex–Petrochemicals) are subject to certain other taxes, such as an income tax (similar to a corporate income tax). Under the Hydrocarbons Income Tax (*Impuesto a los Rendimientos Petroleros*), a “tax rate of 30% is applied to net income, as determined in accordance with the Federal Revenue Law for the applicable fiscal year, while the IEPS tax is an indirect tax on domestic sales of gasoline and diesel that Pemex-Refining collects on behalf of the Mexican Government.” PEMEX, “Form 20-F Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 for the fiscal year ended December 31, 2012,” p. 94–96.
66. In a slightly different approach from previous years, the Mexican government bought and sold put options for 2013. See Matthew Bristow and Carlos Manuel Rodriguez, “Mexico Hedges Against Steep Price Falls,” *Bloomberg News*, October 24, 2012, <http://www.bloomberg.com/news/2012-10-24/mexico-hedges-2013-oil-against-steep-price-falls-correct-.html>. Reuters, “Mexican finance minister says 2013 oil exports hedged near \$84.90p/b,” December 10, 2012, <http://www.reuters.com/article/2012/12/10/mexico-oil-idUSL1E8NA4PQ20121210>; Javier Blas, “Mexico to enjoy \$8bn windfall from oil bet,” *Financial Times*, September 8, 2009, <http://www.ft.com/intl/cms/s/0/ccd87f9e-9bd9-11de-b214-00144feabdc0.html#axzz2n1MqXQLj>; Jens Erik Gould and Hugh Collins, “Mexico Hedged Oil at \$70 Per Barrel, Carstens Says (Update 2),” *Bloomberg News*, November 13, 2008, http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a1cfy2g_6Tik; Matthew Bristow and Carlos Manuel Rodriguez, “Mexico Hedges Against Steep Price Falls.”
67. Reuters, “Mexican finance minister says 2013 oil exports hedged near \$84.90 p/b,” December 10, 2012, <http://www.reuters.com/article/2012/12/10/mexico-oil-idUSL1E8NA4PQ20121210>; Blas; Gould and Collins; Bristow and Rodriguez.
68. Reuters, “Mexico’s lower house passes 2015 budget income plan,” October 30, 2014, <http://www.reuters.com/article/2014/10/30/mexico-economy-budget-idUSL1NOSP3HQ20141030>.