Banco de México

Quarterly Report
October – December 2017

QUARTERLY REPORT

This report analyzes recent developments in economic activity, inflation and different economic indicators in Mexico, as well as the monetary policy implementation in the quarter October – December 2017, and, in general, the activities of Banco de México over the referred period, in the context of the Mexican and international economic environment, in compliance with Article 51, section II of Banco de México's Law.

CONTENTS

1.   Introduction

During 2017, inflation was strongly influenced by a series of shocks of considerable magnitude, both external and domestic, pushing it to close the year at levels not observed since 2001. At the beginning of that year, inflation started to reflect the effects of the Mexican peso depreciation, mainly because of the uncertainty over the future of the bilateral relations between Mexico and the new U.S. administration. During the first part of the year, inflation was also affected by other factors, including: higher energy prices, particularly gasoline and LP gas prices, higher public transportation fares, and higher prices for some agricultural products. Even though inflation began to trend downwards in September 2017, in the last few months of the year, additional shocks pushed headline inflation up to 6.77 percent in December. Some of these shocks were: higher prices for LP gas and certain fruits and vegetables; additional depreciation of the Mexican peso; and the effect of the change in the calendar of the minimum wage increase, effective in December rather than in January. Notably, these shocks occurred in an environment of relatively tight cyclical economic conditions, which could be affecting the pace at which core inflation is declining. In January 2018, annual headline inflation dropped significantly, with a strong decrease in non-core inflation and a decline of smaller magnitude in core inflation. This was a consequence of the implemented monetary policy actions and of the fact that some energy price increases this year were lower than last year's hikes. Nonetheless, non-core inflation at the beginning of the year continued to reflect the shocks that had occurred at the end of 2017, pushing up headline inflation expectations for the end of 2018, while medium- and long-term expectations stayed close to 3.50 percent.

Banco de México adjusted its monetary stance during 2017, raising the target for the Overnight Interbank Interest Rate by 125 basis points between January and June 2017, keeping it unchanged until November. However, in the December 2017 and February 2018 policy meetings, the Board of Governors voted to raise the target interest rate by 25 basis points in each meeting, to reach a level of 7.50 percent. These actions took into account the additional deterioration of inflation given the described circumstances, the objective of maintaining a monetary stance that would prevent second-round effects from affecting the price formation process and reinforce the downward inflation trend towards its target, as well as the cyclical conditions of the economy as outlined before. In the last monetary policy decision, it was stressed that the raise in the reference rate considered the expectation of tighter monetary conditions in the U.S. economy.

The above measures were taken in a context in which, although world economic activity continued a generalized expansion and growth projections have been adjusted upwards, a number of risks persist, both economic and geopolitical, which could negatively affect the global context. In particular, faster-than-anticipated normalization of monetary policy across advanced economies is likely, especially in the U.S., possibly triggering a more volatile environment in international financial markets and restricting financing conditions, especially in emerging economies. This risk has strengthened due to the potential inflation pressures that could be triggered by the recently approved tax cuts and higher public spending in the U.S. Indeed, this fiscal stimulus, in the context of an apparent absence of slackness in the U.S. economy, conflicts with the expectation of gradual U.S. monetary normalization and has fuelled considerable increases in the rates of 10-year and

30-year U.S. treasury bonds this year, leading to downward adjustments in the main stock indexes, albeit from high levels.

In the future, the Mexican economy is estimated to continue growing, possibly benefitting from the faster growth rate of the U.S. economy. However, the persisting uncertainty, especially over the trade relationship of Mexico in North America, could continue to affect investment. Thus, despite a slight improvement in the balance of risks to growth, the downward bias remains. Slack conditions in the economy have been tightening, although recently they seem to have started to revert moderately, except for the labor market. In this context, and considering the expected growth of the economy close to its potential, the cyclical conditions of the economy are estimated to remain around its current levels. Considering the recent performance of inflation, the expected evolution of its determinants, the current monetary policy stance and the horizon at which it operates, headline inflation is forecast to continue declining, approaching its target of 3.0 percent during the year, attaining it in the first quarter of 2019, and fluctuating close to this level during the rest of 2019. These forecasts consider an orderly evolution of the exchange rate, absence of labor market-related pressures, and a considerable decrease in non-core inflation throughout 2018, insofar as the type of shocks that affected it last year do not occur again. Taking into account the levels that inflation has attained, the shocks that have affected it and the persisting risks it still faces, the expected inflation trajectory still exhibits a balance of risks tilted to the upside.

In this environment, the Board of Governors of Banco de México will continue to closely monitor the evolution of inflation with respect to its expected trajectory, considering the horizon at which the monetary policy operates, as well as the available information on all inflation determinants and its medium- and long-term expectations, including the potential pass-through of exchange rate adjustments onto prices, the monetary policy stance of Mexico relative to the U.S. and the evolution of slack conditions in the economy. Given the presence of factors that, given their nature, imply a risk to inflation and its expectations, if necessary the monetary policy will act in a timely and decisive manner to strengthen the anchoring of medium- and long-term inflation expectations and to achieve the convergence to the 3 percent target.

It should be noted that the monetary policy actions that have been implemented to maintain medium- and long-term inflation expectations anchored, the attainment of the fiscal goals in 2017 and the commitment to reach them in 2018, along with the persisting resilience of the financial system have placed the Mexican economy in a better position to tackle possible adverse scenarios. It is important to stress the early renewal of Mexico's Flexible Credit Line with the International Monetary Fund in November 2017 for the next two years, in recognition of Mexico's solid macroeconomic framework. In the future, the Mexican economy is expected to continue facing a complex outlook. Thus, it is especially relevant to encourage the implementation of all actions fomenting greater productivity, and that the authorities move forward in the consolidation of sustainable public finances, in addition to pursuing a prudent and firm monetary policy.

2. Economic and Financial Environment

2.1. External Conditions

The world economy continued to expand in advanced and emerging economies during the fourth quarter of 2017. The growth of the global trade volume remained high, which reflected the rebound in investment and higher manufacturing production. In this juncture, the slack in advanced economies continued to subside, which started to translate into a gradual rise of inflation and inflation expectations, although in most cases they still remain below the respective central banks' targets. Hence, the higher dynamism of the world economic activity, and, in particular, a better growth outlook for the U.S. economy, boosted by the recently approved more expansionary fiscal stance, reflected in a notable upward adjustment in the world growth outlook for 2018 and 2019 (Chart 1).

Chart 1
World Economic Activity

a) Growth Forecast for World GDP in 2017 and 2018
Annual change in percent

b) Selected Economies: Growth Outlook
Annual change in percent
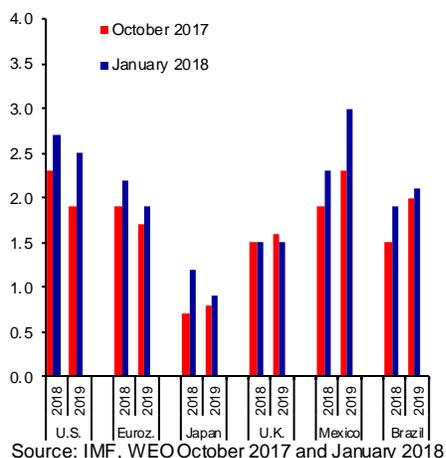
c) Advanced Economies: Natural and Observed Unemployment Rates
In percent

Note: The dotted lines refer to WEO forecasts of October 2017; the solid lines, to WEO forecasts of January 2018.
Source: IMF, WEO October 2017 and January 2018.

Source: IMF, WEO October 2017 and January 2018.
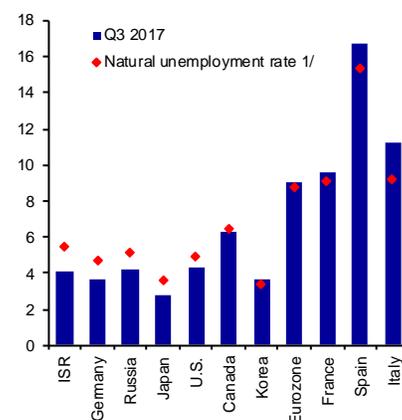
1/ Estimated by OECD.
Source: OECD, Economic Outlook, November 2017.

However, the global economy is still subject to a number of economic and geopolitical risks, some of which have spiked recently. One of them is that a faster-than-anticipated rate of monetary policy normalization in advanced economies can propitiate a more volatile environment in international financial markets and can tighten funding conditions of emerging ones. There is uncertainty over the effects of a more expansionary fiscal policy in the U.S. onto inflation in that country, and, hence, onto the normalization pace of the Federal Reserve's monetary stance. Indeed, this fiscal impulse, in a context in which the U.S. economy does not seem to register slack, has been in conflict with the expectation of a gradual normalization of the monetary stance in that country. This tension has been manifested in financial markets, generating considerable hikes in medium- and long-term interest rates in the U.S. and in other advanced economies so far this year. Similarly, following considerable increases in the assessment of financial assets during 2017, the main stock indices have been adjusted downwards recently (Chart 2).

Chart 2
International Financial Markets

a) 10-Year Bond Yield in Selected Advanced Economies
In percent
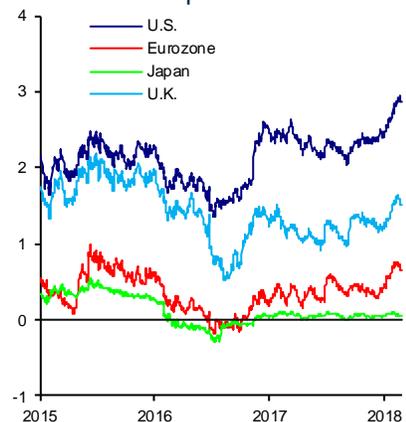
b) Volatility in International Financial Markets (VIX) [1]
Index 01/01/2007=100

c) Advanced Economies: Stock Markets
Index 01/01/2015=100

Source: Bloomberg.
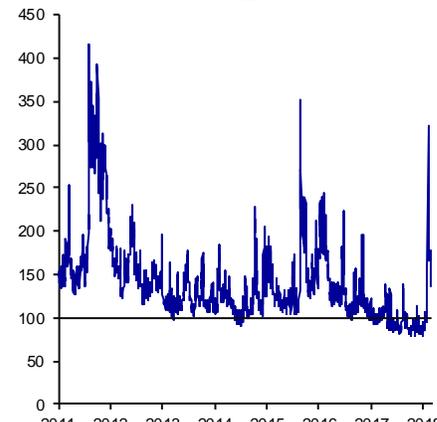
1/ The VIX index is a weighted indicator that measures implied volatility in the options' market for S&P 500.
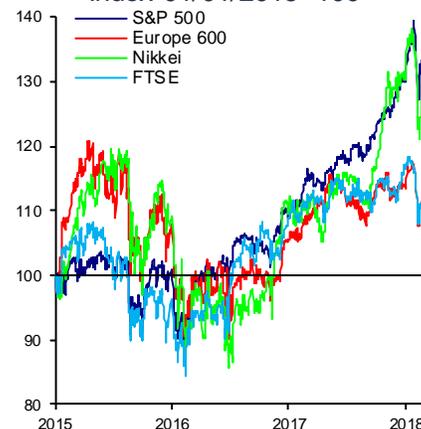
2.1.1.   World Economic Activity

Delving in the above, the U.S. economy continued a cyclical recovery during the period analyzed in this Report. Although the GDP growth at an annualized rate of 2.6 percent in the fourth quarter of 2017 was lower than in the third one, in part it reflects the contribution of the de-accumulation of inventories. The main components of domestic demand exhibited strong dynamism (Chart 3a). Indeed, private consumption rebounded in view of the improved financial position and greater confidence among households, as well as the fading of the impacts caused by the hurricanes that took place in the third quarter (Chart 3b). Similarly, private fixed investment performed favorably, reflecting the recovery of residential construction and the strong growth of investment in machinery and equipment.

In this context, industrial activity showed strong growth in the last quarter of 2017, and expanded at an annualized rate of 8.3 percent (Chart 3c). In particular, the recent hike in energy prices favored the recovery in mining and in the production of equipment for this activity. Meanwhile, the unusually cold weather at the end of the year pushed up demand for electricity and gas for heating, driving the prices considerably upwards. In addition, in the last quarter of the year the manufacturing production expanded significantly, as the impacts of the hurricanes in different regions of the U.S. faded, especially in the high-tech, automotive and car parts, chemical and oil sectors.

Chart 3
U.S. Economic Activity

a) Real GDP and Components
Annualized quarterly change in
percent and percentage point
contributions, s. a.
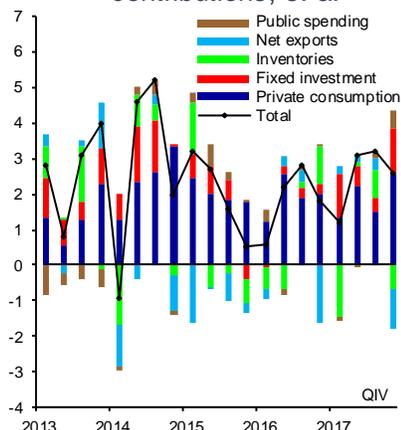
b) Net Wealth of Households and
Consumer Confidence
In percent of disposable personal
income and Index 1985=100, s. a.

c) Industrial Activity
Annualized quarterly change in
percent and percentage point
contributions, s. a.

s. a. / Seasonally adjusted data.
Source: Bureau of Economic Analysis.
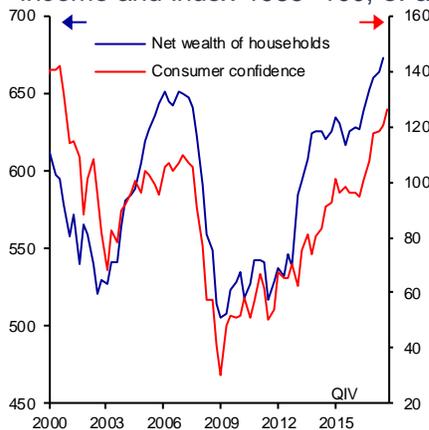
s. a. / Seasonally adjusted data.
Source: Federal Reserve and Conference Board.
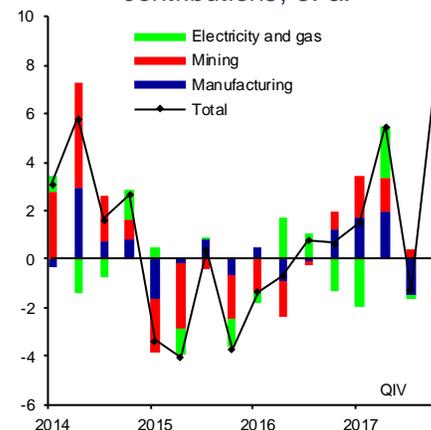
s. a. / Seasonally adjusted data.
Source: Federal Reserve.

Given the solid expansion of the U.S. economy, the estimated output gap in the U.S. suggests that the economy operated above its potential during 2017. This situation is anticipated to continue over the next years, especially given the possible impulse of the recently approved fiscal package on aggregate demand (Chart 4a). These cyclical conditions have been especially notable in the labor market, which resulted in higher wage increments. Indeed, between September 2017 and January 2018 an average of 172 thousand new jobs were generated per month, which is similar to the average of the first nine months of 2017. The unemployment rate slid from 4.2 percent in September to 4.1 percent in January, and lied below the level of 4.6 percent (estimated as long-term by the Federal Reserve). Likewise, other indicators, such as job openings, recruitment and resignation rates, and broader measurements of the unemployment rate point to a lower slack in the labor market (Chart 4b). This led to a recovery in the growth rate of average hourly remunerations, which shifted from an average annual rate of 2.5 percent during 2017 to 2.9 percent in January 2018 (Chart 4c).

Chart 4
Measures of Slack in the U.S.

a) Output Gap
Percentage of GDP

Source: IMF, WEO October 2017.

b) Unemployment Rate
In percent of labor force, s. a.
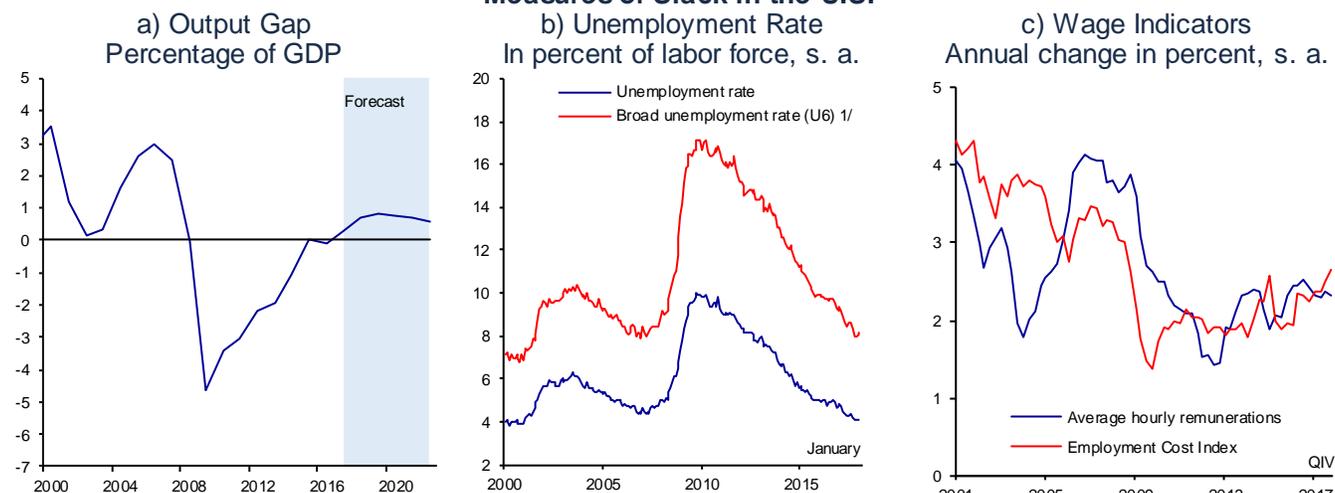
s. a. / Seasonally adjusted data.
1/ It also includes part-time workers who wish to work full time and those who were not considered as unemployed because they have not looked for jobs for the last 4 weeks.
Source: Bureau of Labor Statistics.

c) Wage Indicators
Annual change in percent, s. a.

s. a. / Seasonally adjusted data.
Source: Bureau of Labor Statistics.

As indicated above, in late December the U.S. Congress approved a fiscal reform that included corporate tax cuts, new schemes of capital depreciation and a shift to the territorial tax regime. In addition, the public spending approved by the U.S. Congress in early February has recently been raised by around US$300 billion for the fiscal years 2018 and 2019.[1] These adjustments are expected to foment faster economic growth in the short run (see Box 1). However, in a context in which the economy seems to be operating close to its potential, there is a higher possibility that the fiscal stimulus will eventually translate in a higher inflation and higher interest tares. Similarly, the increase in public debt that may derive from this fiscal policy makes the U.S. economic growth outlook more uncertain in the long run. A possible implementation of protectionist trade policies is among the risks to growth of the U.S. economy.

Other advanced economies also registered a cyclical recovery, which helped to maintain the expectation that the monetary policy normalization process in these economies will continue. Thus, in the Eurozone, GDP grew at an annualized rate of 2.4 percent in the fourth quarter of 2017, supported by strong domestic demand, particularly, private consumption and capital formation. Likewise, the recovery in this region has been increasingly widespread (Chart 5a). In this environment, the unemployment rate maintained a decreasing trend, which seems to be reflecting in moderate wage increases. In the Japanese economy, GDP grew at an annualized rate of 0.5 percent in the fourth quarter. Above all, it reflected the continuous recovery of domestic demand. Notably, with this result the Japanese economy has expanded for eight consecutive quarters, which has not occurred since 2000 (Chart 5b).

---

[1] In addition, approximately US$89 billion were approved to support the reconstruction efforts in the wake of the recent natural disasters.

Chart 5
Economic Activity in Advanced Economies

a) Eurozone: Real GDP
Index 1Q-2008=100, s. a.

b) Japan: Real GDP
Annualized quarterly change in percent, s. a.

s. a. / Seasonally adjusted data.
Source: Eurostat.

s. a. / Seasonally adjusted data.
Source: Cabinet Office of Japan.
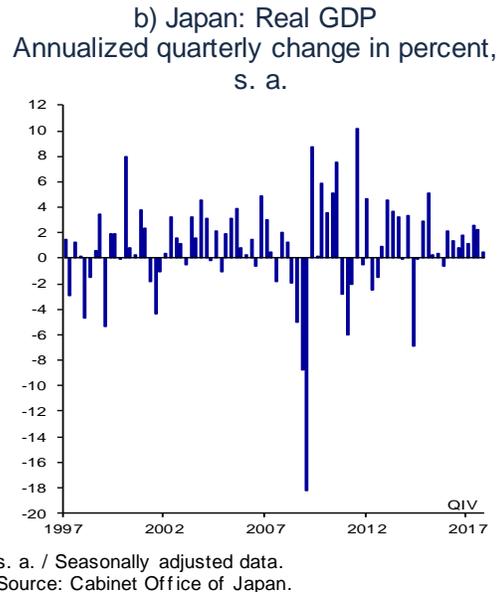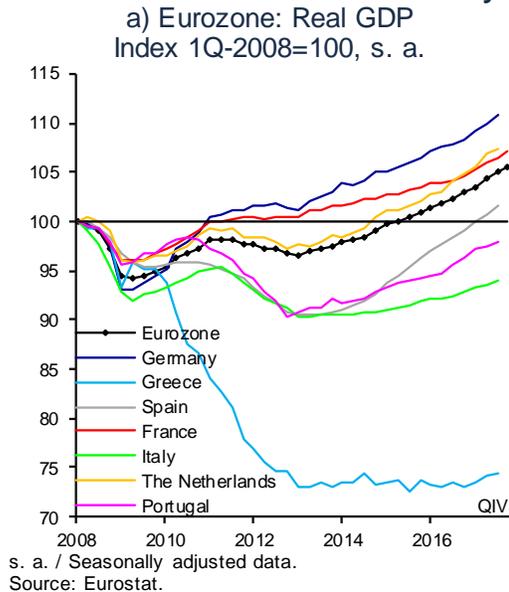
Finally, emerging economies continued to recover during the fourth quarter (Chart 6a and Chart 6b). In particular, the Chinese economy maintained a solid growth pace, supported by a greater dynamism of the services sector and by a moderate expansion in industrial activity. This occurred despite tighter credit conditions, lower fiscal stimuli and tougher regulatory aspects (Chart 6c).

Chart 6
Economic Indicators of Emerging Economies

a) Emerging Economies: Indicators of
Economic Activity
Diffusion index (50=neutral) and the
annual change in percent, 3-month
moving average, s. a.

b) Emerging Economies:
Exports
Annual change of the 3-month
moving average in percent

c) China: Gross Domestic Product
Annual change in percent

s. a. / Seasonally adjusted data.
Note: Industrial production and retail sales expressed in volumes.
Source: CPB Netherlands, Markit, Haver Analytics and IMF.

Note: Nominal data.
Source: Haver Analytics.

Source: Haver Analytics.

<div style="border:1px solid black; padding:10px">

Box 1
Remarks on U.S. Fiscal Policy

1. Introduction

In December 2017, the U.S. Congress approved a fiscal reform that involves a number of modifications to the individual, corporate and international tax regimes. In addition, in early February it approved an increase in spending for approximately US$300 billion for 2018 and 2019. Despite the consensus among analysts that the approved measures will prompt a rebound in economic activity in the short term, these could also significantly raise the U.S. fiscal deficit over the next 10 years.

2. Main Features of the Fiscal Reform

Among the main changes to the individual tax regime, the adjustment in tax rates applicable to different categories of individual incomes is noteworthy, particularly a decrease from 39.6 percent to 37 percent in the top rate. Also, standard deductions have been doubled, the maximum amount associated to fiscal credits for each child has been raised, along with the requirements to access this benefit. Personal exemptions have been eliminated and mortgage interest deduction and deduction for state and local taxes have been limited.

Among the modifications to the corporate fiscal regime, there are cuts in corporate tax rate to 21 percent from 35 percent, as well as a full and immediate expensing of capital investments for five years. In addition, the reform repeals the corporate alternative minimum tax and entitles some entities under special fiscal regimes to deduct 20 percent of income.[1] However, certain deductions have been limited, such as spending on interests and the use of net operating losses from previous fiscal years.[2]

The tax reform also modified the scheme under which multinationals operate.[3] Some of the most remarkable measures aim to discourage the allocation of intellectual property rights in lower tax jurisdictions, and the accumulation of earnings broad.[4]

3. Increase in Public Spending

Besides the fiscal reform, in early February the U.S. Congress approved an increment in public spending, as it raised the spending limits for the 2018 and 2019 fiscal years by US$143 billion and US$153 billion, respectively. Within this budget, 56 percent of the increase is channeled

to the defense spending and 44 percent to other expenditures, including infrastructure, financing of health programs, new programs and opioid treatments. Besides, US$89 billion were approved to support the reconstruction efforts due to the recent damages caused by the natural disasters.

4. Fiscal Impact

There is a consensus among the main entities specialized in fiscal matters that the fiscal reform in the U.S. would lead to a deterioration in the U.S. public balance. Although the adjustments to the international regime would raise tax revenues, it would not compensate for the negative impact caused by changes in the individual and corporate regimes. In accordance with the U.S. Joint Committee on Taxation, the cost of the fiscal reform (excluding interests for the debt services) would amount to about US$1.5 trillion between 2018 and 2027 (Chart 1).[5] This should be complemented by the approved increase in spending by almost US$0.4 trillion, which would imply even greater pressures on public debt.

The impact of the tax reform on the public deficit could be lower due to the positive, albeit moderate, effect on economic growth in the short term, and to a possible approval of cuts in the discretionary public spending. However, higher interest rates derived from further inflation pressures, as a result of the impulse to aggregate demand caused by this package, could raise interests paid on public debt. There is uncertainty over how much a greater economic growth could compensate part of the deficit increment generated by the approved fiscal measures.

---

[1] It refers to entities that use a specific legal form to avoid double taxation via the payment of individual taxes by business owners.

[2] The deduction of net interest expenses is limited to 30 percent of earnings before interest, tax, depreciation and amortization (EBITDA) for four years, and in the future to 30 percent of earnings before interest and taxes (EBIT).

[3] See: Joint Committee on Taxation, Macroeconomic Analysis of the Conference Agreement for H.R. 1, the "Tax Cuts and Jobs Act" (JCX-69-17), December 22, 2017.

[4] The following were established: a single 15.5 percent tax to liquid assets and an 8 percent tax of profits from previous fiscal years held abroad.

[5] The model "Penn Wharton" (PWBM) reflects that this figure would be close to 1.968 trillion while the Tax Foundation estimated this cost at US$1.47 trillion.

</div>

Chart 1
U.S.: Estimated Effect of the Fiscal Reform on Public Balance over 10 Years
In USD billion
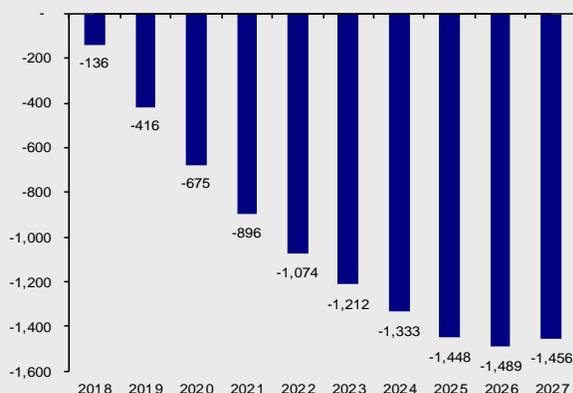
Source: U.S. Joint Committee on Taxation.

5. Economic Impact

As mentioned before, there is a certain consensus among analysts that the fiscal changes will positively affect the economic activity in the short term, via the impact on aggregate demand, labor supply, savings and investment. This impact could be moderate given that, despite a strong reduction in the statutory tax rate, the decrease in the effective rate is estimated to be between merely 3 and 4 percentage points.[6] In addition, the effect of a fiscal stimulus depends on the economy's position in the cycle, and, given the reduced slack in the economy, the effect is expected to be modest. The main transmission channel of these measures on economic activity is via an increment in households' disposable income, which would be translated into the expansion of consumption. Meanwhile, higher corporate profits could be reflected in greater return on capital and on labor, further encouraging households' spending. From a supply-side perspective, a lower tax burden on workers' earnings, as well as extending the child tax credits would create incentives for a larger amount of workers, mainly low-income workers, to join the labor force. In addition, decreased capital costs and its deductibility would not only encourage greater domestic investment, but could also favor the reallocation of productive investments, as lower effective tax rate increases the benefit of investing in the U.S. as compared to other economies, although, as stated above, the reduction in the effective rate is modest. Even though a possible increase in the capital stock could boost the economy's potential, it is contingent on stabilizing the deficit and the debt level. In addition, there is uncertainty

over the implications of a higher public debt level for U.S. economic growth in the medium and long terms.

Estimates of the reform's impact on the main macroeconomic variables vary considerably.[7] Nonetheless, different projections point to a moderate impact on economic activity during the first years. Despite the great uncertainty over the long-term impact, benefits related to growth are estimated to fade before the first decade concludes, given that most mentioned measures will no longer be force by 2025. In particular, the estimations suggest that the reform would imply an accumulated impulse of between 0.5 and 1.3 percent on the GDP level after three years, which represents a moderate impact on annual growth of economic activity (Table 1). Furthermore, the International Monetary Fund (IMF) estimates that although the reform would imply a greater growth over the first three years, it would restrict growth starting from 2021. This is mainly due to the fact that some of these measures will expire during the following years and that a possible increase in public deficit would lead to higher interest rates, which would offset the initial effects of this reform.

Table 1
U.S.: Macroeconomic Estimates of the Fiscal Reform Impact on the GDP Level (Accumulated Effect)
Percentage

	2018	2019	2020	2027
Tax Foundation	0.40	0.90	1.30	2.90
Tax Policy Center	0.80	0.70	0.50	0.00
Model of Penn Wharton Budget	n.a.	n.a.	n.a.	0.6-1.1
Joint Tax Committee	0.8-0.9	0.8-0.9	0.8-0.9	0.1-0.2

Source: Tax Foundation, Tax Policy Center, Penn Wharton, United States Congress Joint Committee on Taxation and European Central Bank (ECB).

6. Accounting Impact

In addition to economic and financial effects of this legislation, certain provisions aim to discourage businesses from using accounting procedures to take advantage of tax benefits when registering profits in lower tax jurisdictions. That is, so far a large number of multinationals, both in the U.S. and abroad, have resorted to such strategies, as transfer prices, the change of residence of intellectual property rights, and loans among subsidiaries and branches, in order to register profits in lower tax jurisdictions, thus affecting the accounting of trade flows and of investment in the U.S. national accounts. For example, when changing the intellectual property to a different country, the income generated by a U.S. business is counted as a primary income due to its investment abroad, rather than as an export of goods or services. This strategy implies an overestimation of the

---

[6] See: Duddley, W. (2018). The Outlook for the U.S. Economy in 2018 and Beyond. Remarks at the Securities Industry and Financial Markets Association, New York.

[7] In particular, a greater fiscal deficit can generate a shift in investment, as the resources used by the government to fund this deficit are no longer available to households and businesses who want to take credits and invest.

trade deficit of goods and services, as well as of primary net income in the U.S. The distortions in measuring the trade balance deficit also affect other national accounts, such as Gross Domestic Product, the capital accounts and the measures of labor productivity. The reversal of the referred strategies could be noted in accounting adjustments in the balance of payments of the U.S. and its trade partners, thus raising the estimated value of the GDP and lowering the U.S. trade deficit[8].

7. Final Remarks

In line with the consensus among analysts, in the short term the fiscal measures approved in the U.S. will positively affect U.S. economic activity. However, this effect would be moderate, due to the reduced slack in the economy. This derives from the fact that the fiscal multiplier is lower when an economy is going through an advanced phase of its economic cycle.[9] The fact that the fiscal changes can cause the economy to operate above its potential would be reflected in higher inflation and higher interest rates. This would be complemented by the effects that a possible increase in the fiscal deficit and in the public debt could have on long-term growth.

[8] See: Guvenen, F., Mataloni, R., Rassier, D., and Ruhl, K. (2017). "Offshore Profit Shifting and Domestic Productivity Measurement", NBER Working Papers No. 23324.

[9] See: Auerbach, A. and Gorodnichenko, Y. (2012). "Measuring the Output Responses to Fiscal Policy", *American Economic Journal:*

Economic Policy, Vol. 4, No. 2, pp. 1-27 and Antolín-Díaz, J., Arias, J., Petrella, I., Rubio-Ramirez, J. "The dynamics effects of Fiscal Shocks: A narrative Sign Restrictions Approach", Presentation; February, 2018.

2.1.2. Commodity Prices

The global economic recovery has also been seen in a higher demand for commodities, which affected the evolution of their prices. In particular, oil prices maintained the upward trend that had been observed since mid-2017, and marked the highest level over the last 3 years (Chart 7a). This rebound derived from higher demand for crude oil, and a lower growth of oil supply, as a result of lower production in the North Sea and Venezuela, as well as geopolitical tensions in the Middle East. Starting in February, however, crude oil prices dropped, when the production in the North Sea was resumed and as the oil production in the U.S. kept rising. This pushed the prices to levels observed in late December. Notably, lower crude oil prices have not fully offset the hike in the said prices observed since mid-2017. Industrial metal prices increased by the end of the fourth quarter, in light of the expected acceleration of global manufacturing activity (Chart 7b). In contrast, grain prices remained low, given the persisting growth outlook for production in the next months (Chart 7c).

Chart 7
International Commodity Prices [1/]

a) Crude Oil USD/barrel	b) Metals Index 01/01/2014=100	c) Corn and Wheat USD/bushel

1/ Spot Market.
Source: Bloomberg.
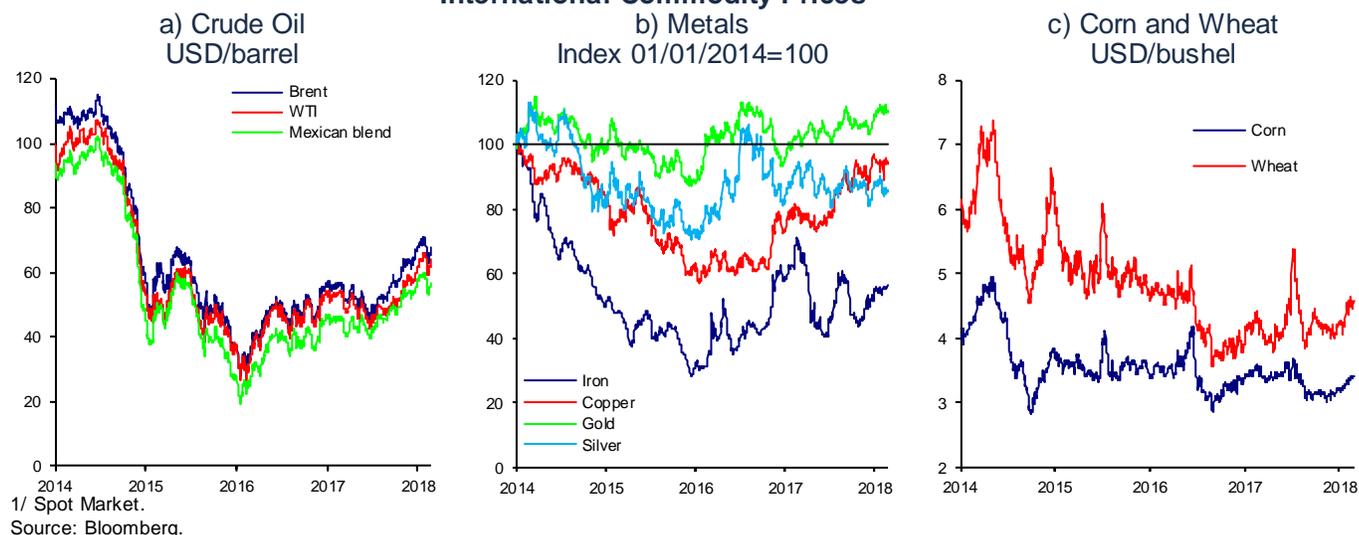
2.1.3. Inflation Trends Abroad

During most of the recovery phase, following the 2008 financial crisis, overall inflation has remained low. This has been particularly notable in advanced economies, where inflation has persisted below the respective central banks' targets for a few years. A number of factors (some of which were more structural) contributed to this: the technological change and greater global economic integration, which could be exerting downward pressure on prices. However, this trend has been offset by the impact of tighter cyclical conditions in advanced economies' labor markets, and, recently by higher energy prices. As a result, over the last few months inflation and inflation expectations have risen gradually, although in most cases, they still remain below the central banks' targets (Chart 8). Inflation in many emerging economies has been relatively stable, at levels close to or below the respective central banks' targets, which principally responded to lower inflation pressures derived from the cyclical position of their economies. Nonetheless, in some countries, mainly in Asia, inflation has slightly increased, due to higher prices for foods and gasoline during the last months.

In the U.S., inflation has started to rise, once a number of temporary factors started to dissipate, which have lowered the prices of certain items. In particular, the negative influence of the evolution of imports' prices and energy prices onto inflation in recent years has begun to dissipate. The recent depreciation of the U.S. dollar and higher oil prices, along with a lower slack in the economy are expected to contribute to a rebound in inflation (Chart 9). Nevertheless, so far inflation has still remained below the Federal Reserve target.

Specifically, the annual change of the consumption deflator was 1.7 percent during the fourth quarter, after observing rates close to 1.5 percent during the third one. Similarly, core inflation shifted from an annual rate of 1.4 percent to 1.5 percent over the same time span, as this indicator's monthly changes have accelerated recently. The evolution of inflation in January 2018, measured with the Consumer Price Index (CPI), with the Import Price Index (IPI) and the Producer Price Index (PPI), points to a rebound, which spurred an upward adjustment in inflation projections for the

end of the year. This also was notable in a gradual increase of inflation expectations implicit in financial instruments.

Chart 8
Inflation in Advanced and Emerging Economies

a) Headline Inflation
Annual change in percent

b) G4: Core Inflation
Annual change in percent

c) G4: Long-term Inflation
Expectations Implicit in Financial
Instruments [1]
In percent
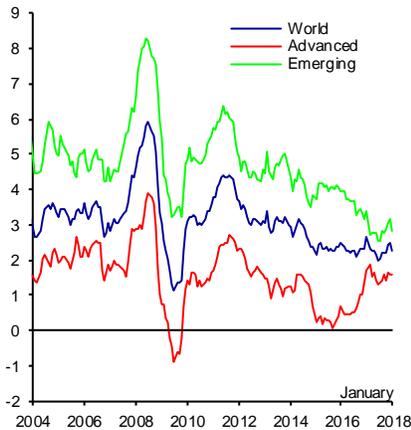
Note: The sample of countries used here represents 82.2 percent of global GDP measured by the purchasing power parity. The figure of inflation in the U.S. in January corresponds to estimates of the Federal Reserve Bank of Cleveland.
Source: Prepared by Banco de México with data from Haver Analytics, the Federal Reserve Bank of Cleveland and IMF.
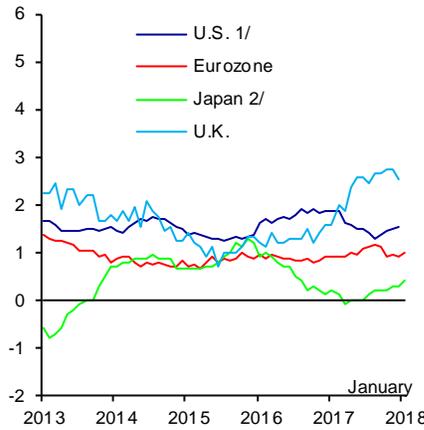
1/ The consumption deflator was used.
2/ Fresh foods and energy products are excluded, along with the direct impact of a higher consumption tax.
Source: Prepared by Banco de México with data from Haver Analytics.

1/ Inflation expectation in a 5-year period for the following 5 years. Expectations obtained from swap contracts in which one counterparty agrees to pay a fixed rate in exchange for receiving a referenced payment at an inflation rate over a specified period.
Source: Prepared by Banco de México with data from J.P. Morgan.

In the Eurozone, headline inflation shifted from an annual rate of 1.5 percent in September 2017 to 1.3 percent in January 2018. Similarly, core inflation declined from 1.1 percent to 1.0 percent during the same period. Nonetheless, inflation expectations in this region have increased, especially those implicit in financial instruments. In Japan, inflation reached 0.9 percent in annual terms in January, rising from 0.7 percent in September. Core inflation, excluding fresh foods and energy products, adjusted from 0.2 to 0.4 percent in annual terms in this period.

Chart 9
Inflation in the U.S.

| a) Consumption Deflator Annualized annual and monthly change in percent, s. a.	b) Price Index of Imports of Consumer Goods and Nominal Broad Exchange Rate Index Annual change in percent	c) Percentage of the Basket of Consumption Spending Deflator with Annual Changes in Different Ranges In percent, s. a.
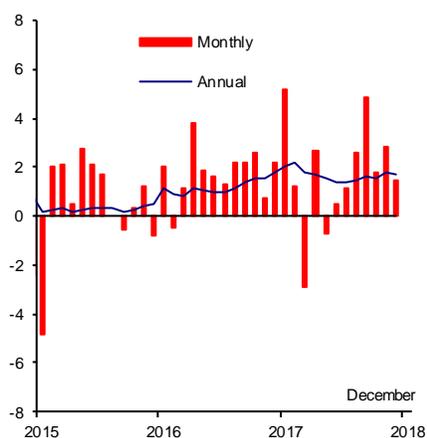
s. a. / Seasonally adjusted data
Source: Bureau of Economic Analysis.
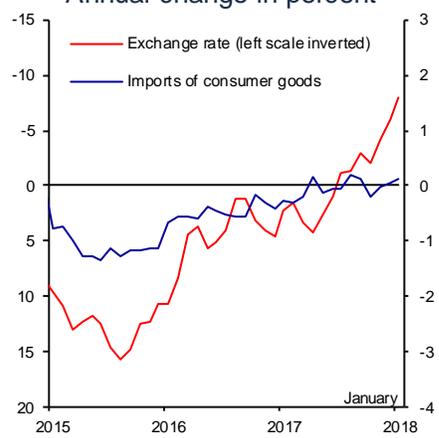
Source: Bureau of Labor Statistics and Federal Reserve.
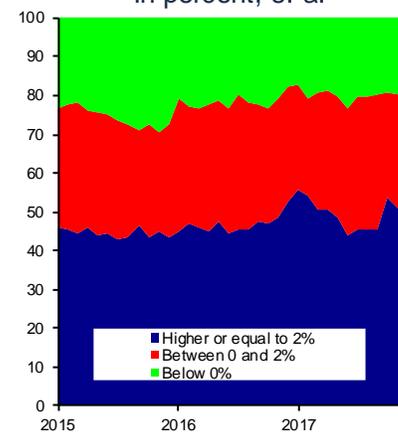
s. a. / Seasonally adjusted data.
Source: Prepared by Banco de México with data from Bureau of Economic Analysis.

2.1.4. International Monetary Policy, and Financial Markets

In the reference period, some of the main central banks continued to move forward with the strategy of a gradual withdrawal of the monetary stimulus, albeit at different rates depending on their position in the economic cycle. Although the recent inflation performance has been so far congruent with a scenario of a gradual adjustment in the monetary policy stance of the main advanced economies, the risk of a faster-than-anticipated rise of inflation, and, thus, of benchmark interest rates in some of these countries has increased.

In its meeting of January, the U.S. Federal Reserve left the target range of federal funds' rate unchanged, after increasing it by 25 basis points in December. This Institute stressed that the economic activity in the U.S. has performed better than expected, and inflation is anticipated to increase this year and to stabilize around its target in the medium term. This has reinforced the estimation that the benchmark rate will go up in March. However, it noted that economic conditions are expected to continue performing in line with the gradual increments in its target rate.

In its meeting of January, the European Central Bank (ECB) maintained the levels for the reference interest rates unchanged and confirmed that the current rate of the asset purchase program will continue until September this year. However, it noted that this date could be extended if inflation does not exhibit a trend congruent with its target. Nonetheless, the EBC stressed that its monetary stance has been effective in laying the groundwork to reach the inflation target in the medium term. Therefore, it does not rule out a revision of its asset purchase program starting from September. In its meeting of January, the Bank of Japan maintained unchanged its short-term deposit rate, the target for long-term government bonds and the amount of its asset purchase program. Finally, the Bank of Japan considered that its current monetary stance remains adequate for the convergence to its inflation target and inflation expectations. Meanwhile, the monetary policy stance varied across the

emerging economies, depending on their position in the economic cycle and on idiosyncratic factors. There were still downward adjustments in the reference rates in some countries, while in others these rates increased.

Strong economic prospects for the world economy and the expectation that the monetary policy normalization processes carried out by the main central banks would take place gradually continued fomenting the financial markets during most of the period analyzed in this Report. In this way, volatility persisted at historically low levels in the last quarter of 2017. Similarly, the stock markets kept performing well during the quarter, particularly in the U.S., where the expectations and, subsequently, tax cuts favorably affected the expected corporate sector performance. Nevertheless, starting from early 2018, global financial markets observed volatility episodes, in a context of more pronounced increases in medium- and long-term interest rates. These events seem to reflect the greater risk of a faster monetary policy normalization process than that currently anticipated by the markets. The adjustment in the stock markets in early February 2018 occurred in a context in which the valuations of these assets were especially high (Chart 10a). Capital flows to emerging economies were stable during most of the quarter, which was interrupted in February due to the upsurge in volatility in international financial markets (Chart 10b).

In the foreign exchange markets, after the U.S. dollar appreciation during 2016, reflecting the expectation that the Federal Reserve would continue with the monetary policy normalization process, the U.S. dollar had a generalized depreciation during most of 2017 and in early 2018, in view of upside adjustments in growth expectations of other advanced economies. The risk of a potential deterioration in the fiscal deficit and the current account of the U.S., derived from the recently approved fiscal package, could bring greater uncertainty regarding the performance of the economy in the medium and long terms, as well as the U.S. dollar rate (Chart 11).

Chart 10
Financial Indicators in Emerging Economies

a) Emerging Economies: Stock Markets
Index 01/01/2015 = 100
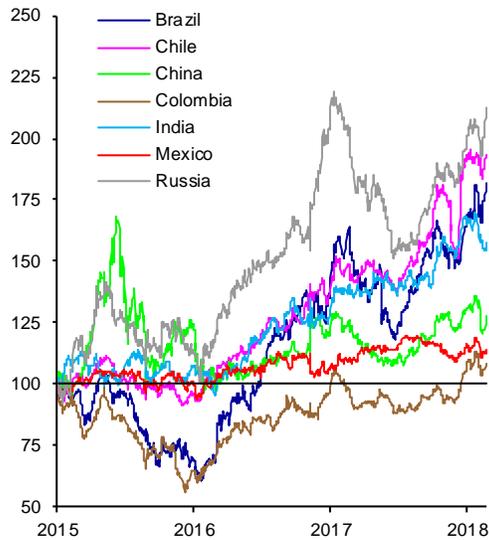
Source: Bloomberg.

b) Monthly Flows of Funds to Emerging Economies [1]
In USD billion
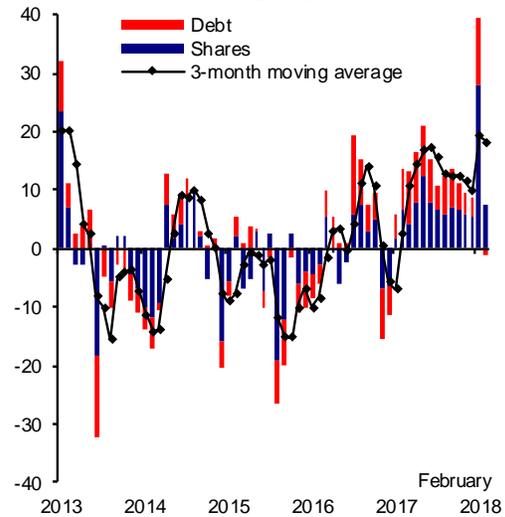
1/ The sample covers the funds used for the sale and purchase of emerging countries' shares and bonds, registered in advanced economies. The flows exclude the portfolio performance and exchange rate adjustments.
Source: EPFR.

Chart 11
Foreign Exchange Markets

a) Advanced Economies: Exchange Rate against the U.S. dollar
Index 01/01/2015 = 100
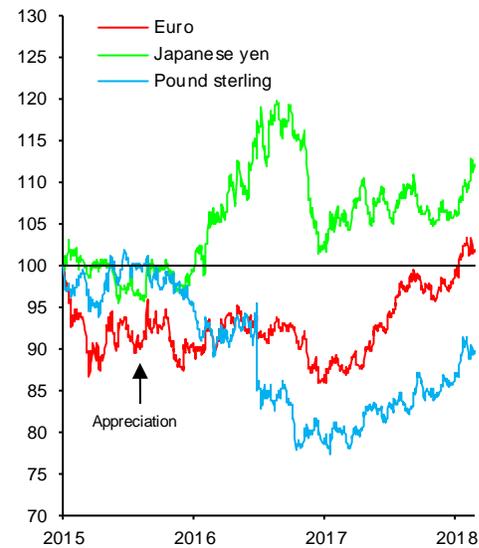
Source: Bloomberg.

b) Emerging Economies: Exchange Rate against the U.S. dollar
Index 01/01/2015 = 100
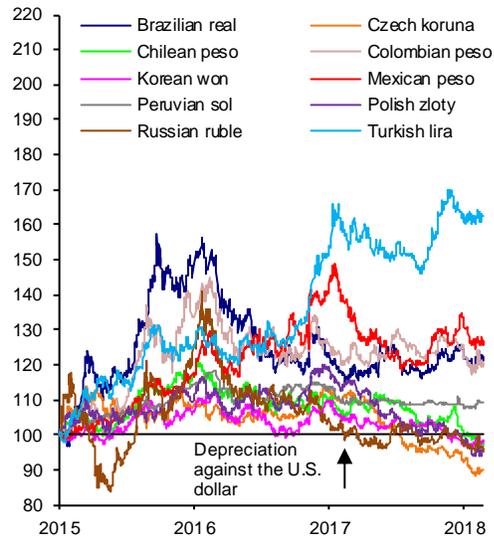
2.1.5. Risks to World Economic Outlook

The recent global environment, characterized by stronger, more sustained growth in different regions, and by the foreseeable effects of a more expansionary fiscal stance in the U.S. suggests that the balance of risks to the global economy is upwards in the short term. However, in the medium term different important risks can negatively affect growth:

i.   Significant changes to the regional and global integration model, which resulted, among other factors, from the turn to protectionist policies across some advanced economies. In this context, there is still uncertainty related to the NAFTA renegotiations and the future relations of the U.K. and the European Union.

ii.   Greater-than-expected deceleration of the Chinese economy, with possible implications for global demand. This could occur, among other reasons, due to disruptions possibly generated by a sudden and abrupt adjustment in the financial system of that country.

iii.   Risks associated with a possible escalation of geopolitical tensions in different regions.

Certain risks can affect the global financial stability, and, in particular, the financing conditions in emerging economies:

i.   The U.S. monetary policy normalization process that is faster than expected by financial markets, and possibly in other advanced economies, in view of higher inflation pressures.

ii.   A global environment of higher interest rates can pressure the financial strength of non-bank financial intermediaries, which represents important challenges to regulation and supervision that need to be fostered by a proper risk management.

2.2. Evolution of the Mexican Economy

2.2.1. Economic Activity

In the last quarter of 2017, the Mexican economy experienced an important expansion fostered mainly by the performance of the services sector. This stands in contrast with the contraction in the third quarter, in the wake of the September earthquakes and a major decline in the oil production platform in that same month. Regarding the components of aggregate demand, exports continue to perform favorably and private consumption still displays a positive trend, albeit with signs of a slight deceleration. In contrast, investment remained weak.

Delving into the performance of external demand, in the period of October – December 2017 manufacturing exports continued to perform favorably, which was consistent with the more depreciated level of the real exchange rate with respect to that observed in 2015 and with the strengthening of the global economic activity in 2017 (Chart 12a).[2] The expansion of manufacturing exports in the fourth quarter of 2017 resulted from growth in automotive exports and the rest of manufactures. Within automotive exports, shipments to the U.S. and the rest of the world increased, although the growth rate of the latter was more pronounced (see Box 2). The favorable evolution of non-automotive manufacturing exports largely derived from the dynamism of those destined to countries other than the U.S., while those sent to the U.S. have decelerated slightly (Chart 12b and Chart 12c). In the analyzed quarter, oil exports increased, despite remaining at low levels. This improvement was due to a higher average price of the Mexican crude oil blend for exports and a greater volume of exported crude oil compared to the previous quarter (Chart 12d).

---

[2] Although the real exchange rate appreciated in 2017 relative to 2016, it remained more depreciated than in 2015, when it had adjusted following the fall in international crude oil prices that had started in the second half of 2014.

Chart 12
Mexican Exports
Index 2013=100, s. a.

a) Total Manufacturing Exports
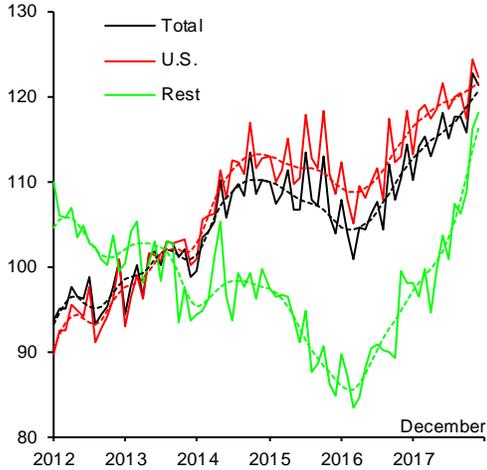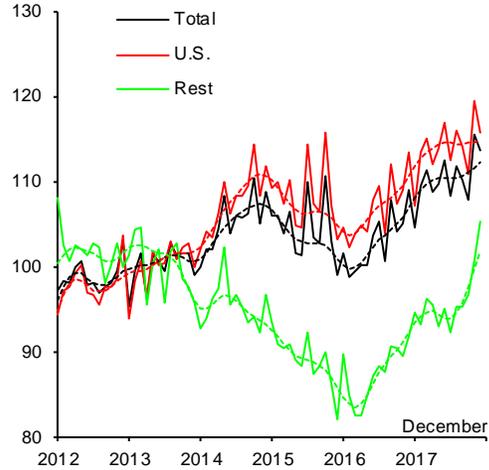
s. a. / Seasonally adjusted and trend data based on information in nominal dollars. The former is represented by a solid line, the latter by a dotted line.
Source: Banco de México with data from SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest.

b) Non-automotive Manufacturing Exports

c) Automotive Manufacturing Exports
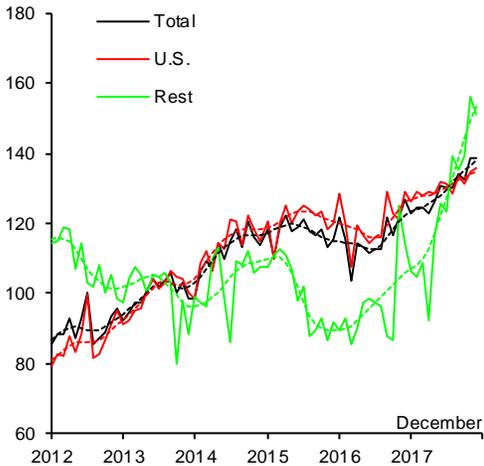
s. a. / Seasonally adjusted and trend data based on information in nominal dollars. The former is represented by a solid line, the latter by a dotted line.
Source: Banco de México with data from SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest.

d) Oil Exports and Crude Oil Export Platform
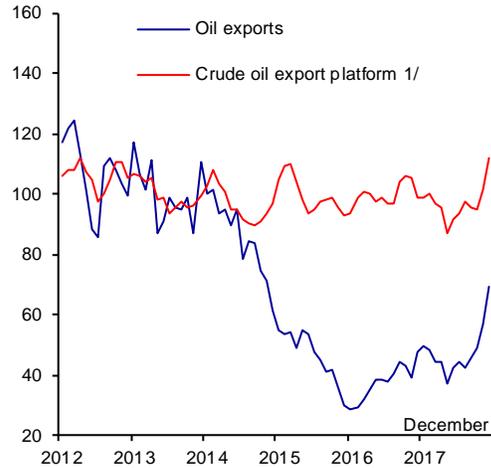
s. a. / Seasonally adjusted series based on data in nominal dollars.
1/ 3-month moving average of daily barrels of the seasonally adjusted series.
Source: Banco de México with data from *PMI Comercio Internacional*, S.A. de C.V; and SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest.

Box 2
Recent Evolution of Mexican Automotive Exports

1. Introduction

Mexico's manufacturing exports have performed favorably since the second half of 2016, after displaying a negative trend in 2015 and in early 2016, which was a result, among other factors, of the weak world economy (see Box 2 of the Quarterly Report April - June 2016). Its most recent performance shows a positive evolution of manufacturing exports (both automotive and non-automotive), in which the dynamism of car exports to the U.S., and especially to the rest of the world, stands out.

The dynamism of automotive exports has responded to the significant investment to the sector over the recent years, both by assembly plants with previous presence in Mexico as well as new firms. This could have been the result of the country's attractiveness as an investment destination, which reflects and at the same time strengthens Mexico's comparative advantage in this sector. In this context, the dynamism of automotive exports is particularly favorable for the economic activity not only due to the direct effects on the productive activity of the sector, but also because of its content of national added value, which is on average greater than that incorporated in the rest of exported manufacturing goods.

2. Recent Evolution of Automotive Exports

In 2017, total automotive exports registered an annual growth of 11.8 percent. This was a result of the 32.7 percent increase in car shipments, the 8.3 percent increase in truck shipments and the 1.3 percent increment in car parts shipments (Table 1 and Chart 1). In particular, car exports destined to countries other than the U.S. grew 48.3 percent, and exports to the U.S. expanded 27.0 percent (Table 1 and Chart 2). This progress came after the decline of 1.0 percent in 2016 in total automotive exports, and, in particular, of 4.3 percent in car exports.

In this context, the greater growth rate in 2017 of automotive exports to countries other than the U.S. resulted in a higher share of them in total Mexican

automotive exports. Indeed, between 2016 and 2017 it increased from 14.6 to 16.8 percent (Table 1).

Chart 1
Mexican Automotive Exports
Indices 2015=100, 3-month moving average, s. a.
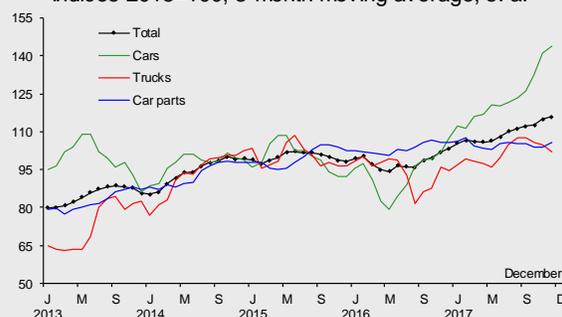
s. a. / Seasonally adjusted data.
Source: Banco de México with data from SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest.

Chart 2
Mexican Car Exports
Indices 2015=100, 3-month moving average, s. a.
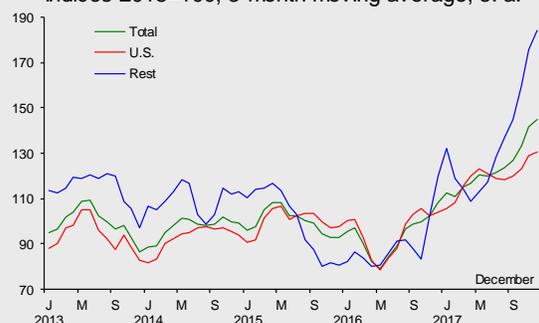
s. a. / Seasonally adjusted data.
Source: Banco de México with data from SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest.

Table 1
Structure by Destination of Automotive Exports
Percent

|	Percentage structure				Annual percent change			Contribution to annual change, percentage points		
	2000	2015	2016	2017	2015	2016	2017	2015	2016	2017
Total	**100.0**	**100.0**	**100.0**	**100.0**	**4.7**	**-1.0**	**11.8**	**4.7**	**-1.0**	**11.8**
U.S.	91.2	85.2	85.4	83.2	6.3	-0.8	8.8	5.3	-0.6	7.5
Rest	8.8	14.8	14.6	16.8	-3.7	-2.6	29.2	-0.6	-0.4	4.2
Cars[1]	43.4	28.7	27.7	32.9	1.4	-4.3	32.7	0.4	-1.2	9.1
U.S.	37.4	21.1	20.3	23.0	7.2	-4.8	27.0	1.5	-1.0	5.5
Rest	6.0	7.6	7.4	9.9	-11.8	-3.0	48.3	-1.1	-0.2	3.6
Trucks [2]	13.8	26.5	25.4	24.6	4.9	-5.4	8.3	1.3	-1.4	2.1
Car parts	42.8	44.8	46.9	42.5	6.7	3.7	1.3	2.9	1.6	0.6

1/ Passenger cars and others, mainly used for passenger transportation.
2/ Vehicles to transport over 10 people; for merchandise transportation and special use.
Source: Banco de México with data from SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest.

The dynamism of car exports to countries other than the U.S. has mainly resulted from higher sales to Europe, Latin America and Asia (Chart 3). In the particular case of Europe, the value of car exports between 2016 and 2017 increased by 90.5 percent, especially due to shipments to Germany.

Chart 3
Car Exports to Destinations Other than the U.S.
USD billion, 6-month moving average, s. a.
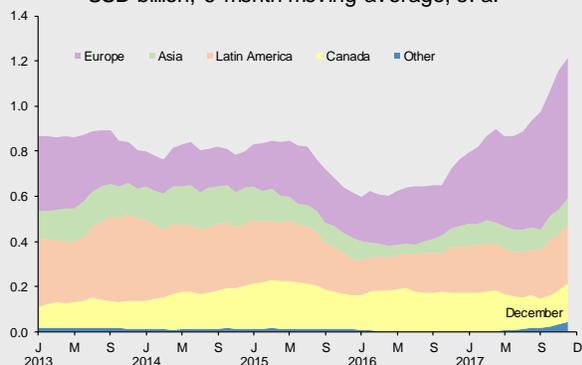
s. a. / Seasonally adjusted data.
Source: Banco de México with data from SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest.

Higher investment in the sector has contributed to this evolution. Indeed, these investments are estimated to have raised the production capacity by around 20 percent between 2016 and 2017 (an approximate rise of 755 thousand units with respect to the estimated installed capacity of 3.8 million units at the end of 2015; Chart 4).

Chart 4
Production of Light Vehicles and Installed Capacity
Thousands of annualized units
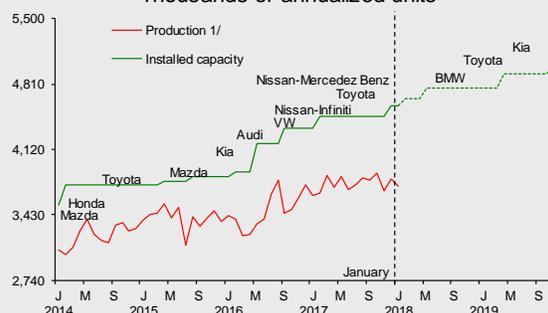
1/ Seasonally adjusted data.
Source: Production prepared and seasonally adjusted by Banco de México with data from AMIA. Installed capacity is estimated based on assembly plants' press releases and journalistic notes.

In particular, Nissan and Volkswagen have significantly increased their installed capacity in recent years. Kia and Audi started operations in May and September 2016, respectively, and during 2017 both assembly plants contributed with approximately 10 percent of total domestic production. In the particular case of Audi, the assembly plant of the premium class was set up in Mexico to mainly supply the European market, although also the rest of the world. In the future, Nissan and Toyota are expected to increase their exports over the next few years, thanks to the construction of new plants. Similarly, Mercedez Benz and BMW are anticipated to begin car production in Mexico in 2018 and 2019, respectively, which is expected to continue strengthening the dynamism of automotive exports.[1]

---

[1] These statistics are prepared based on journalistic notes, press releases, web pages and the financial reports of the assembly plants, direct consultations with firms and data from the Mexican Automotive Industry Association (AMIA).

At the same time, higher investment in the automotive sector not only has raised productive capacity in that industry, but has also oriented it to the production and exports of vehicles of higher value. Indeed, as of 2016 a clear growing trend in the unit value of exported cars has emerged (Chart 5). In that way, the higher value in U.S. dollars of shipments of cars abroad is not attributed exclusively to a greater exported volume, but also to a greater value per unit exported. This raises the sector's contribution to the evolution of the merchandise trade balance.

Chart 5
Unit Value Index of Car Exports
Index 2015=100, 3-month moving average


Source: Banco de México with data from SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest. See Box 2 of the Quarterly Report October – December 2015 for a description of the methodology used to estimate unit values.

In connection with this, the domestic value-added contained in automotive exports is estimated to be higher than that contained, on average, in the remaining exports of manufactured goods.[2] In particular, although in 2000 the shares of the domestic value-added included in the gross value of exports of automotive and non-automotive manufacturing goods were similar, since 2001 the one corresponding to automotive exports has been higher than that of the remaining manufacturing goods (Chart 6).

Chart 6
Domestic Value-Added Contained in Mexico's Manufacturing Exports
Percentage relative to gross exports

Source: Banco de México based on World Input-Output Database.
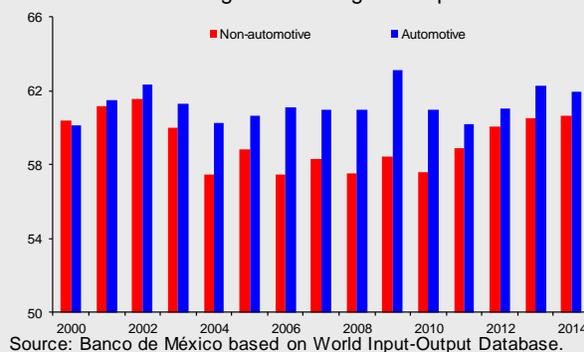
5. Final Remarks

In the context in which the dynamism of automotive manufacturing exports to the U.S., and more notably, to the rest of the world has positively affected economic activity, not only due to the higher value of exports, but also given the implications in terms of generating a greater added value per U.S. dollar exported, the importance of strengthening the institutions and other elements that make Mexico an attractive investment destination is bolstered. Similarly, considering the dependence of the automotive sector on the transport infrastructure to receive inputs and to distribute final goods, the preceding highlights the need to improve the infrastructure in Mexico to continue expanding its export capacity and to foster the diversification of export markets.

---

[2] Koopman, et al. (2014) propose an accounting and analytical framework to break down the gross exports' value, tracing the productive links between industries and countries. Wang, et al. (2014) expand this framework, so that breaking down of the exports is also valid at the sectoral and bilateral level. The latter approach is used in this Box to estimate the domestic value-added contained in Mexican manufacturing exports, using the world input-output matrix. For a detailed description of these estimates, see Box 1 of the Quarterly Report July – September 2017, Banco de México.

In the fourth quarter of 2017, the performance of the domestic demand components was heterogeneous. Indeed, the trend of private consumption remained positive, despite showing signs of a deceleration, while investment maintained a negative trajectory:

i.   The incipient deceleration of the monthly indicator of private consumption could be associated, in part, with the negative impact of the September earthquakes, which seems to have mainly affected the services consumption, while the trend of the consumption of goods remained positive (Chart 13a). However, a certain loss of dynamism in some of the private consumption determinants could also affect its performance. Indeed, the wage bill has dropped in real terms over the last few quarters (Chart 14a). This reduction is associated with a lower real average income, given that the employed population kept expanding in the reported period. Similarly, consumer confidence deteriorated in late 2017 and early 2018, while credit for consumption maintained lower growth rates as compared to 2016 (Chart 14c and see Section 2.2.3.). In contrast, incomes from remittances have remained especially high, which could have contributed to maintain a certain positive trend in private consumption (Chart 14b).

ii.   More timely indicators, although of a smaller coverage, such as the revenues of retail sales, continued decelerating with respect to the dynamism exhibited in 2016, while domestic sales of light vehicles maintained the negative trend that had started at the end of that same year (Chart 13b).

iii.   In the fourth quarter of 2017, the negative trajectory of spending on investment during most of that year persisted (Chart 15a). In particular, in the period of October – November spending on machinery and equipment showed a negative trend, while the trend of spending on construction kept decreasing. Regarding investment in construction, the residential component remained weak, while the non-residential one maintained the declining trend that had been observed since the beginning of 2015 (Chart 15b). By contracting sector, in the reference period private investment in construction maintained a negative trajectory, possibly affected by the uncertainty over the NAFTA renegotiations. Similarly, although spending on public investment in construction slightly recovered in the second half of 2017, it is at particularly low levels after exhibiting a decreasing trend, especially since the end of 2015 (Chart 15c).

Chart 13
Consumption Indicators
Index 2013=100, s. a.

a) Total Private Consumption, Consumption of National Goods and Services
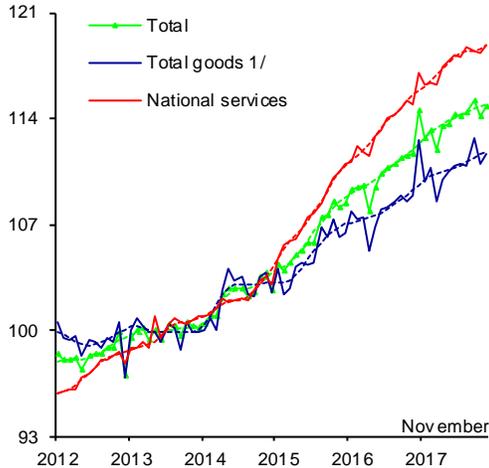
s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
1/ Prepared and seasonally adjusted by Banco de México. Includes national and imported goods.
Source: Mexico's National Accounts System (SCNM), INEGI.

b) Domestic Retail Sales of Light Vehicles and Revenues of Retail Businesses
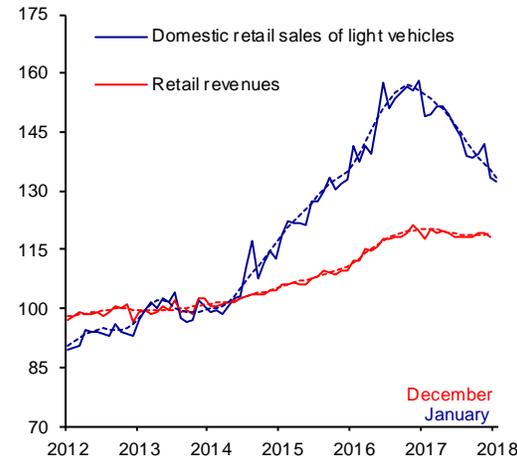
s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
Source: Prepared by Banco de México with data from the Mexican Automotive Industry Association (AMIA) and the Monthly Survey of Commercial Establishments (EMEC), INEGI.

Chart 14
Determinants of Consumption

a) Total Real Wage Bill
Index 2013=100, s. a.
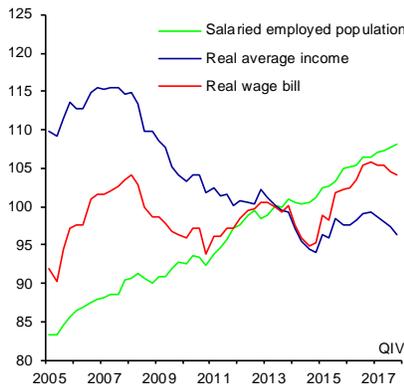
s. a. / Seasonally adjusted data.
Source: Prepared by Banco de México with data from the National Employment Survey (ENOE), INEGI.

b) Workers' Remittances
Billions, USD and constant MXN, s. a.
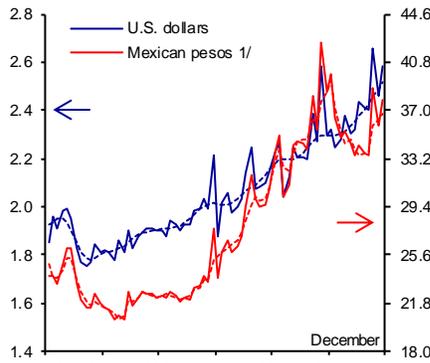
s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
1/ Prices as of the second fortnight of December 2010.
Source: Banco de México and INEGI.

c) Consumer Confidence
Index January 2003=100, s. a.
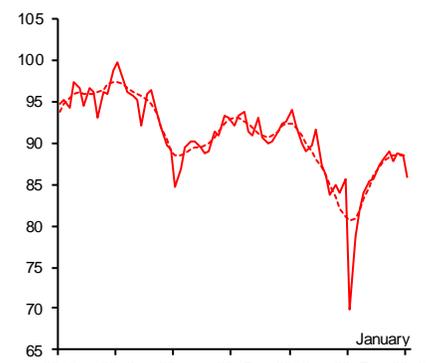
s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
Source: National Consumer Confidence Survey (ENCO), INEGI and Banco de México.

Chart 15
Investment Indicators

a) Investment and its Components
Index 2013=100, s. a.
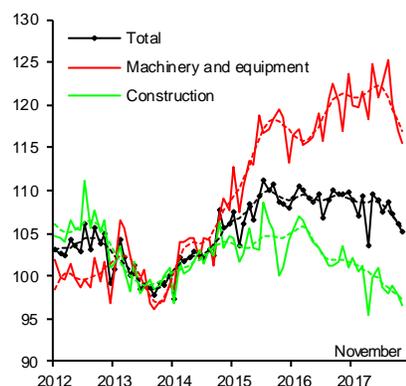
b) Investment in Residential and
Non-residential Construction
Index 2013=100, s. a.
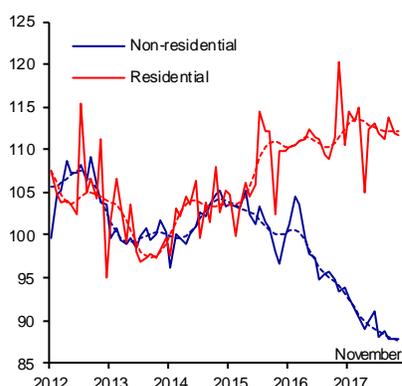
c) Real Value of Production in
Construction by Contracting
Institutional Sector
Index January 2012=100, s. a.
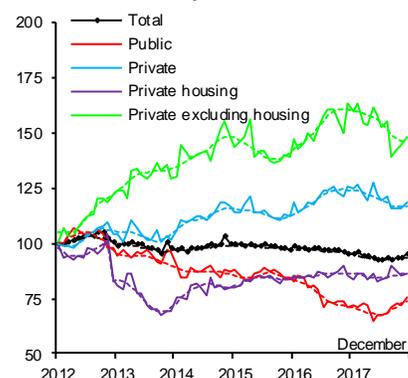
s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
Source: Mexico's National Accounts System (SCNM), INEGI.

s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
Source: Mexico's National Accounts System (SCNM), INEGI.

s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
Source: Prepared by Banco de México with data from ENEC, INEGI. Seasonally adjusted by Banco de México, except for the total.

Regarding the evolution of economic activity from the production side, GDP expanded at a seasonally adjusted quarterly rate of 0.78 percent in the fourth quarter (a 1.5 percent annual rate with both original and seasonally adjusted data), after having contracted 0.17 percent in the third quarter (Chart 16a and Chart 16b). Based on these results, in 2017 as a whole the economic activity expanded 2.0 percent (2.3 percent with seasonally adjusted figures), which compares with the rate of 2.9 percent registered in 2016 (2.7 percent with seasonally adjusted data).[3]

The expansion of productive activities in the fourth quarter of 2017 was supported by the dynamism of the services sector, in the wake of the September earthquakes. In contrast, the performance of industrial activity remained weak, although in December it rebounded, reflecting a better evolution of construction during that month, which could be associated with the reconstruction efforts after the September earthquakes (Chart 17a and Chart 17b). In particular:

i.   Within the industrial activity, in the fourth quarter of 2017 mining maintained the negative trend that had been observed over the last few years. However, in October it recovered from an additional contraction in September, derived from a drop in crude oil production (Chart 18b).

---

[3] In 2017, the annual growth rate of GDP (using original series) was lower than that estimated with seasonally adjusted data, due to a higher comparison base with respect to the previous year, given that 2016 was a leap year. It should be noted that conversely and for the same reason, in 2016 the GDP growth rate (with original figures) was greater than that estimated with seasonally adjusted data.

Chart 16
Gross Domestic Product

a) Quarterly Changes
Percent, s. a.

b) Annual Changes
Percent

s. a. / Seasonally adjusted data.
Source: Mexico's National Accounts System, INEGI.
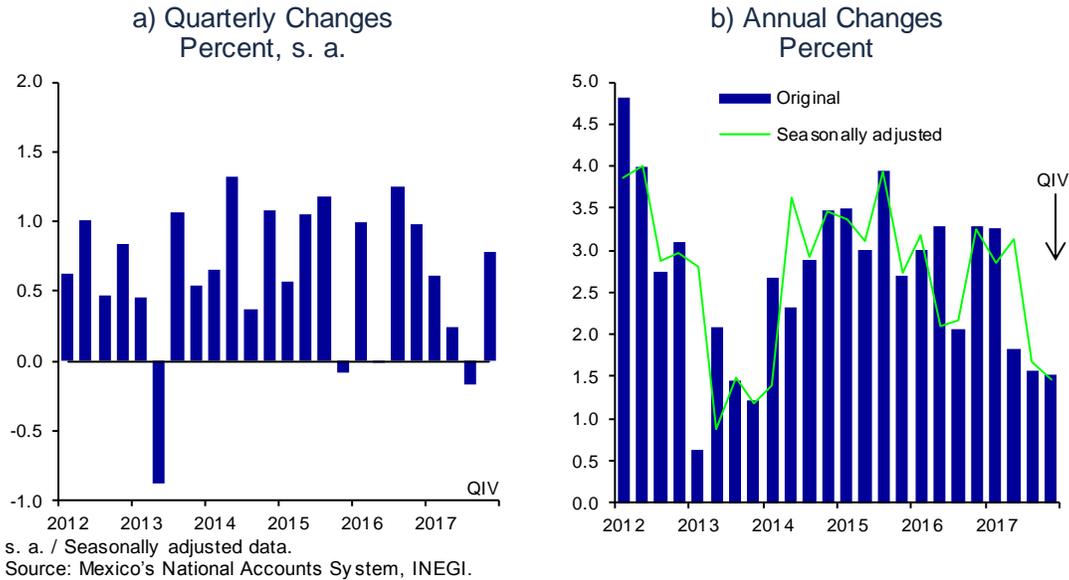
Chart 17
Production Indicators
Index 2013=100, s. a.

a) Global Economic Activity Indicator

b) Industrial Activity

s. a. / Seasonally adjusted and trend data. The former is
represented by a solid line, the latter by a dotted line.
Source: Mexico's National Accounts System (SCNM), INEGI.

s. a. / Seasonally adjusted and trend data. The former is
represented by a solid line, the latter by a dotted line.
Source: Monthly Industrial Activity Indicator, Mexico's National
Accounts System (SCNM), INEGI.

ii.   In contrast, in the reported period the manufacturing activity showed a positive trajectory, although the growth rate remained lower than in the second half of 2016 (Chart 17b). The transport equipment subsector presented a certain loss of dynamism relative to the growth it displayed in 2016 and in the first half of 2017. In contrast, the aggregate of manufacturing excluding transport recovered over the last few months, following the weakening it had exhibited in late 2016 and in early 2017 (Chart 18a). In particular, the beverages and tobacco industry, and the basic metals industry performed favorably. However, the manufacturing of oil- and carbon-derived products continued a negative trend, while the

chemical industry and the manufacturing of computer equipment and other electronic components somewhat decelerated, which is congruent with the evolution of non-automotive exports to the U.S.

iii.　The following factors contributed to the recovery of the tertiary activities in the fourth quarter of 2017: progress in trade and increases in transportation, mail and warehousing; education; business support-related; and mass media services (Chart 19). In this context, the favorable performance of some services in the reported period seems to have reflected the fading of the effects of the September earthquakes.

iv.　The quarterly seasonally adjusted expansion of the primary activities in the fourth quarter of 2017 derived, to a large extent, from a larger sown area in the autumn – winter cycle, as well as from higher production of maize grain, cotton, avocado, walnut and grain sorghum (Chart 17a).

Regarding the external accounts of the country, in 2017 the deficit of the current account continued to decline to levels below those observed in 2015 and 2016. This was in a context in which the real exchange rate remained at depreciated levels with respect to 2015 and in which the strengthening of global economic activity contributed to the recovery of Mexico's manufacturing exports. This occurred despite the increase in the deficit in the fourth quarter of 2017 as compared to the same period of 2016 (Chart 20b and Chart 20c). In particular, the current account deficit as a share of GDP shifted from 2.1 to 1.6 percent between 2016 and 2017 (from US$22.8 billion to US$18.8 billion, respectively). The lower deficit in 2017 with respect to 2016 mainly reflected a larger non-oil trade balance, which even changed from a deficit in 2015 and 2016 to a surplus in 2017, although larger surpluses in the remittances and travelling accounts were also contributing factors. In contrast, in 2017 the deficit of the oil trade balance continued to widen (Chart 20a).

Chart 18
Manufacturing and Mining Sectors
Index 2013=100, s. a.

a) Manufacturing Sector
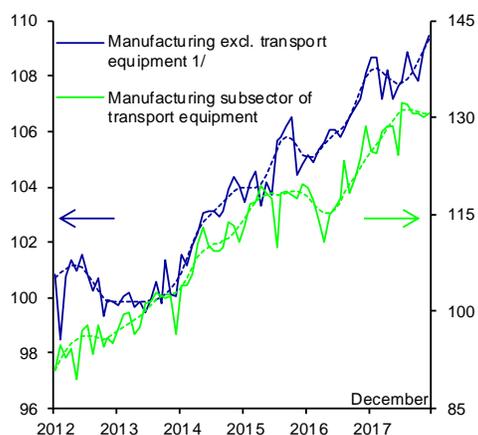
b) Mining Sector Components
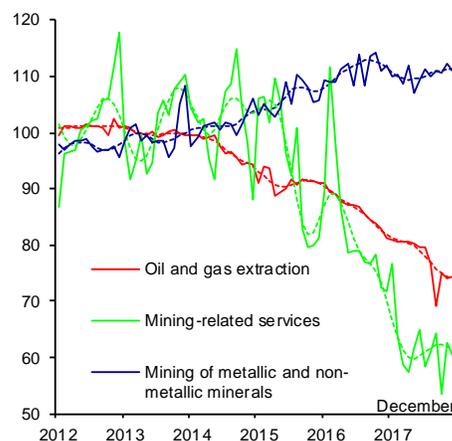
s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
1/ Prepared and seasonally adjusted by Banco de México.
Source: Monthly Industrial Activity Indicator, Mexico's National Accounts System (SCNM), INEGI.

s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
Source: Monthly Industrial Activity Indicator, Mexico's National Accounts System (SCNM), INEGI.

Chart 19
IGAE of the Services Sector
Index 2013=100, s. a.
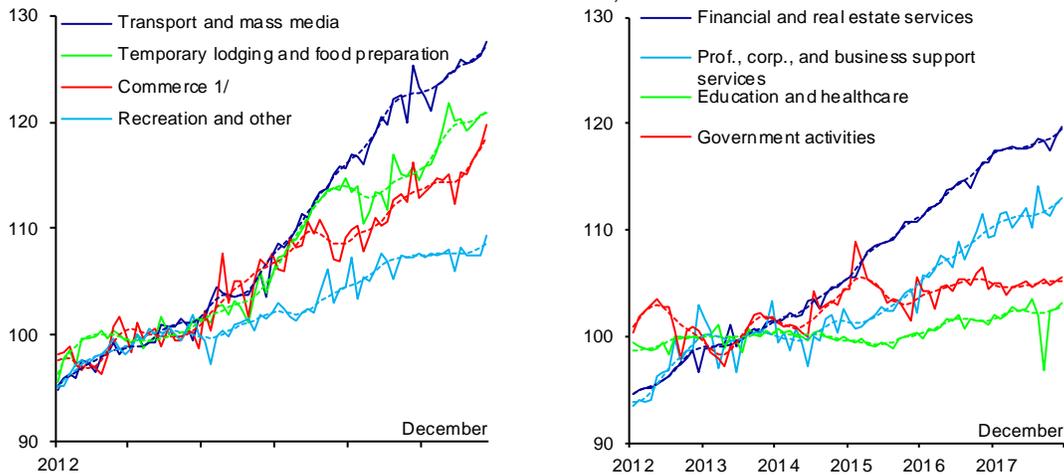
s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
1/ Prepared by Banco de México. It includes retail and wholesale trade.
Source: Mexico's National Accounts System (SCNM), INEGI.

Chart 20
Trade Balance and Current Account

a) Trade Balance
USD millions

b) Current Account
USD millions
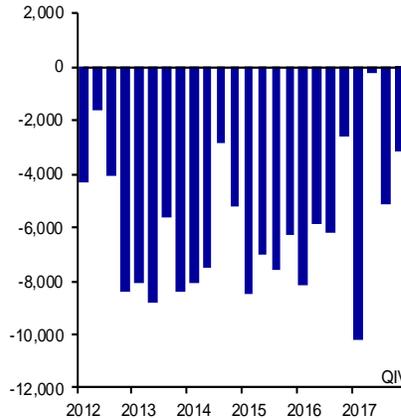
c) Current Account
Percentage of GDP

Source: SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest.

Source: Banco de México.
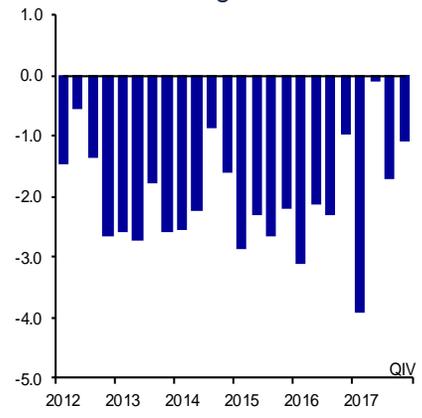
Source: Banco de México and INEGI.

2.2.2. Labor Market

In the fourth quarter of 2017, unemployment rates remained particularly low (Chart 21) and lower than those that are estimated to be congruent with an environment of stable inflation over the last few years (Chart 22). Nonetheless, in the last months they seem to have stopped their downward trend. This has occurred in a context in which labor participation was low, although in the reported period it increased relative to the previous quarter, albeit from low levels. Thus, the employment rates of the economy as a whole continued to grow, while the number of IMSS-affiliated

jobs maintained high dynamism, the declining trend of the labor informality rate continued and marked the lowest levels over the last 13 years.[4]

Despite this, there were no significant wage-related pressures in the analyzed period. Wage indicators exhibited nominal growth rates similar to those observed in the previous quarter, which in a comparison with the accumulated inflation of the previous four quarters implied negative real changes. Nevertheless, if compared to the expected inflation in the last quarter of 2017 for the next 12 months it showed a slight advance in real terms. In particular, the average nominal wage of salaried workers in the economy registered an annual growth rate of 4.1 percent, an increase similar to that in the previous quarter, while the average adjustment of contractual wages negotiated by firms under federal jurisdiction was 4.0 percent (Chart 23). In contrast, the daily wage associated to IMSS-affiliated workers presented a nominal annual increase of 5.2 percent. The performance of certain nominal wages in the last quarter could have been affected by the increase in the minimum wage, which, unlike in previous years, went into effect on December 1, rather than in January of the following year.

Thus, unit labor costs in the economy as a whole decreased in the last quarter of the year and maintained a downward trend. This was largely because of the absence of significant pressures on real earnings. It should be pointed out, however, that those corresponding specifically to the manufacturing sector continued to show an upward trend (Chart 24a and Chart 24b).

Notably, the performance of real earnings in 2017 reflected, in part, the adjustment induced by the considerable depreciation of the real exchange rate as compared to its level in 2015. This was a consequence of the shocks that have affected the Mexican economy. In this sense, the monetary policy, in line with its mandate, has taken measures to preserve the purchasing power of the Mexican peso, so that, even in the presence of these shocks, the negative effects of this environment on real wages have been mitigated.

---

[4] Currently, the unemployment rates and the labor informality rates are measured based on the results of the National Employment Survey (ENOE), which began to be conducted in 2005.

Chart 21
Labor Market Indicators

a) National and Urban Unemployment Rates
Percent, s. a.

- Urban unemployment rate
- National unemployment rate

December

2005 2007 2009 2011 2013 2015 2017

s. a. / Seasonally adjusted and trend data. The former is
represented by a solid line, the latter by a dotted line.
Source: National Employment Survey (ENOE), INEGI.
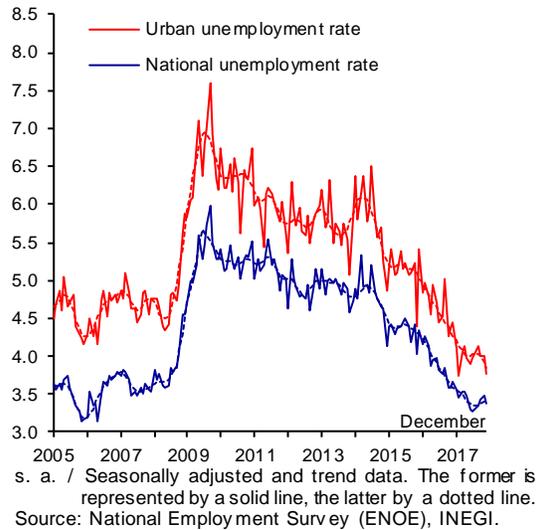
b) National Labor Participation Rate [1]
Percent, s. a.

December

2005 2007 2009 2011 2013 2015 2017

s. a. / Seasonally adjusted and trend data. The former is
represented by a solid line, the latter by a dotted line.
1/ Percentage of Economically Active Population (EAP) with
respect to the population of 15 years and older.
Source: National Employment Survey (ENOE), INEGI.
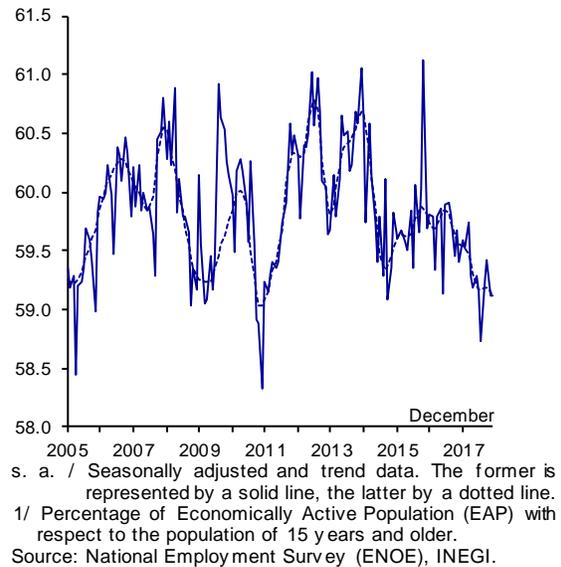
c) IMSS-insured Workers, Total IGAE and
Working Population
Index 2013=100, s. a.

- IMSS-insured workers 1/
- Total IGAE
- Total workers

January
December
QIV

2006 2008 2010 2012 2014 2016 2018

s. a. / Seasonally adjusted data.
1/ Permanent and temporary jobs in urban areas. Seasonal
adjustment by Banco de México.
Source: Prepared by Banco de México with data from IMSS and
INEGI (SCNM and ENOE).
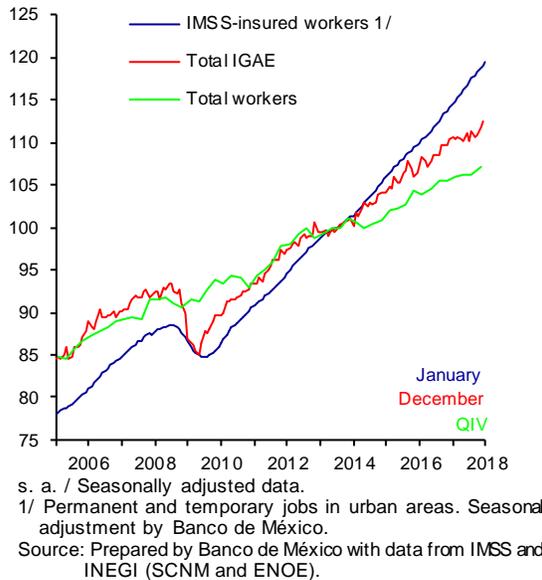
d) Informal Sector Employment [1]
and Labor Informality [2]
Percent, s. a.

- Informal sector employment rate
- Labor informality rate

December

2005 2007 2009 2011 2013 2015 2017

s. a. / Seasonally adjusted and trend data. The former is
represented by a solid line, the latter by a dotted line.
1/ It refers to individuals working in non-agricultural economic units,
operating with no accounting records and using households'
resources.
2/ It includes workers who, besides being employed in the informal
sector, work without social security protection, and whose
services are used by registered economic units, and workers
self-employed in subsistence agriculture.
Source: National Employment Survey (ENOE), INEGI.

Chart 22
Estimate of the Unemployment Gap
Percent, s. a.

a) Unemployment Rate [1]
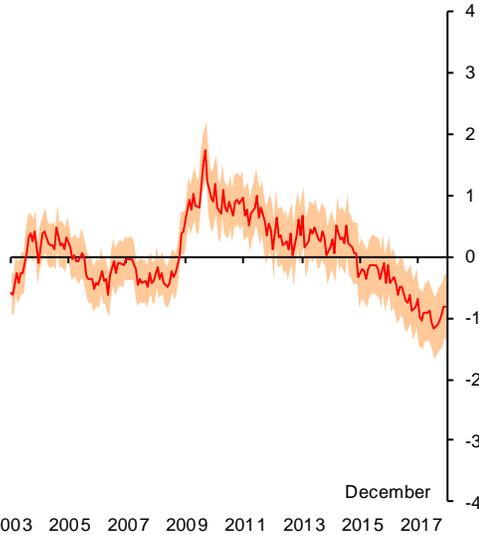
b) Unemployment Rate and Informal Wage Workers [1]
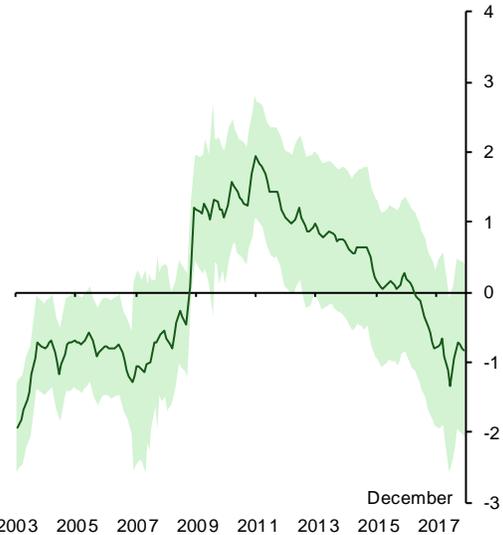
2003 2005 2007 2009 2011 2013 2015 2017

s. a. / Seasonally adjusted data.
1/ Shaded areas represent confidence intervals. An interval corresponds to two average standard deviations among all estimates.
Source: Banco de México.

2003 2005 2007 2009 2011 2013 2015 2017

s. a. / Seasonally adjusted data.
1/ Shaded areas represent confidence intervals. An interval corresponds to two average standard deviations among all estimates.
Source: Banco de México.

Chart 23
Wage Indicators
Annual change in percent

a) Average Wage of Salaried Workers according to the National Employment Survey [1]
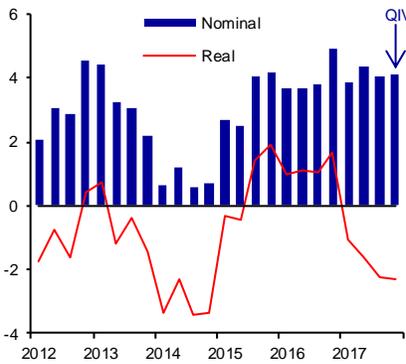
b) Nominal Contractual Wage [2]
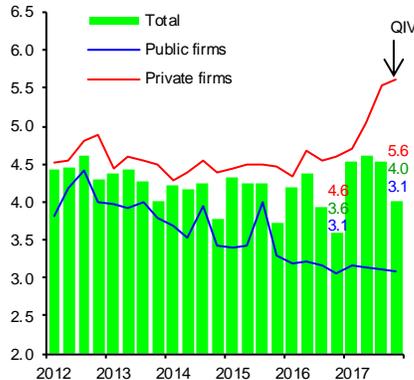
c) Daily Wage of IMSS-affiliated Workers [3]
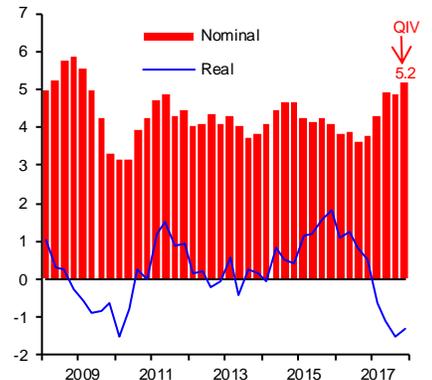
1/ To calculate average nominal wages, the bottom 1 percent and the top 1 percent in the wage distribution were excluded. Individuals with zero reported income or those who did not report it are excluded.
2/ The contractual wage increase is an average weighted by the number of involved workers. The number of workers in firms under federal jurisdiction that report their wage increases each year to the Secretary of Labor and Social Welfare (STPS) is approximately 2.3 million.
3/ During the fourth quarter of 2017, on average 19.6 million workers were registered at IMSS.
Source: Calculated by Banco de México with data from IMSS, STPS and INEGI (ENOE).

Chart 24
Productivity and Unit Labor Cost
Index 2008=100, s. a.
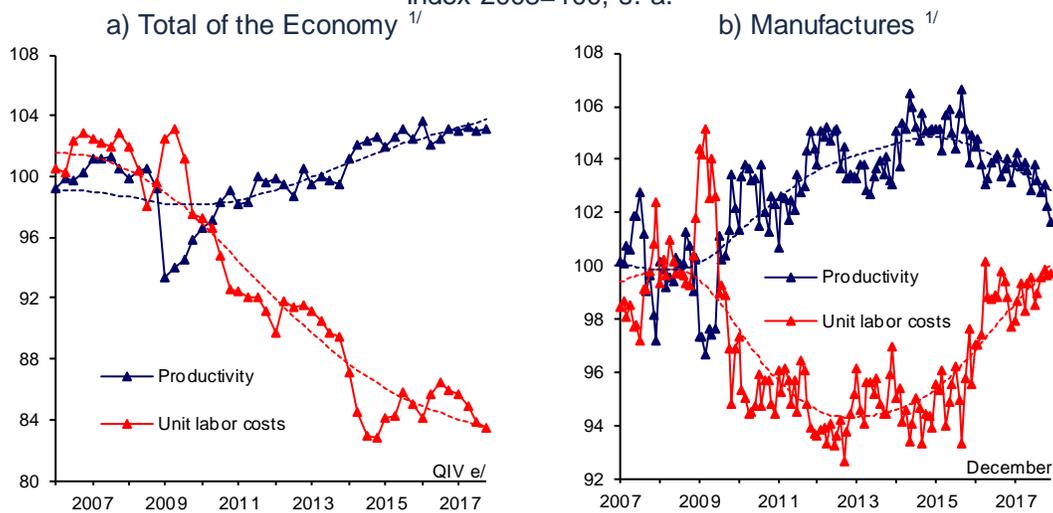
a) Total of the Economy [1/]

b) Manufactures [1/]

s. a. / Seasonally adjusted and trend series. The former is represented with a solid line, the latter, with a dotted line.
e/ The figure of the fourth quarter of 2017 is Banco de México's estimate based on the GDP data published by INEGI (SCNM).
1/ Labor productivity based on hours worked. 2013 base series of Mexico's System of National Accounts.
Source: Prepared by Banco de México with data from INEGI.

s. a. / Seasonally adjusted and trend series. The former is represented with a solid line, the latter, with a dotted line.
1/ Labor productivity based on hours worked.
Source: Prepared by Banco de México with seasonally adjusted data from the Monthly Manufacturing Business Survey and the Monthly Indicator of Industrial Activity of Mexico's System of National Accounts. 2013 base series, INEGI.

2.2.3.   Domestic Financial Assets, Money and Financing

On January 31, 2018, Banco de México released new monetary aggregates, domestic financial assets and financing statistics, which broaden an array of analytical exercise that can be carried out to better comprehend the interaction among these indicators and the evolution of economic activity and inflation in Mexico, which is key to make monetary policy decisions.[5] Box 3 presents the summary of the new statistics features and illustrates some of the possible analytical applications.

---

[5]   In fact, these indicators are used in Box 4 to identify slack conditions in the economy.

<div style="border:1px solid black; padding:10px;">

Box 3
Remarks on New Measurements of Monetary Aggregates and Domestic Financial Assets in Mexico

1. Introduction

As part of Banco de México's continuous effort to improve its statistics in order to better diagnose different aspects of the economy, on January 31, 2018 the statistics of monetary aggregates based on a new methodology (following the international standards) were released. This redefinition resulted from a revised measurement of *broad money*[1] in Mexico, which should be periodically carried out given the innovation of financial instruments and the general development of the financial system, along with the surge of new and better sources of information. On the same date, a new range of indicators, known as "domestic financial assets" were made public, which include, in addition to the financial instruments contained in the monetary aggregates, other instruments held by *money-holding sectors* (*Holders*, hereinafter)[2] and that are issued in the domestic markets, but that, given their properties, are not part of the monetary aggregates.

This Box seeks to illustrate some of the possible analytical applications of the new statistics of monetary aggregates and domestic financial assets. First, the new indicators and their main features are briefly described, after which some statistical exercises are presented illustrating, on the one hand, the relation between economic activity in the short term and monetary aggregates and domestic financial assets, and, on the other hand, the long-term correlation between monetary aggregates and inflation.[3]

2. New Indicators' Composition

First of all, the new definition of monetary aggregates in Mexico contemplates a narrow aggregate (M1) and a broad aggregate (M2). The methodology both follows international standards, and is therefore comparable with aggregates measured in other countries. In addition to these two indicators, two broader aggregates (M3 and M4) were defined, which consider the specific characteristics of the Mexican economy, such as, for instance, residents'

and non-residents direct holdings of public assets. Domestic financial assets are broader aggregates that comprise instruments such as housing and retirement savings accounts and money market securities.

Table 1 sketches out the structure of monetary aggregates and domestic financial assets. In adherence with international practice, the broader aggregates gradually incorporate those instruments that are typically used more as a vehicle of savings and less for transactional purposes. [4]

3. Relation between Monetary Aggregates and Domestic Financial Assets vs. Economic Activity and Inflation

In accordance with the IMF's Monetary and Financial Statistics Manual, *monetary aggregates are constructed to measure the money available in an economy to purchase goods and services, or to invest in other assets*. This suggests that their dynamics has information on Holders' consumption patterns and could therefore give signals on the current or future evolution of macroeconomic variables, such as aggregate demand or inflation. In this respect, there is an extensive academic literature that documents the relations of money growth and growth of the economic activity, on the one hand, and inflation, on the other.[5] Therefore, central banks around the world closely monitor these indicators.[6]

New measures of domestic financial assets are broader indicators than monetary aggregates, as they include financial instruments that are not necessarily used in the short term to acquire goods and services —such as households' resources in retirement funds or asset holdings by households and businesses—, but which rather represent an important asset of Holders. In this sense, these indicators can signal at the level of savings and the type of investments of the non-financial private sector. Similarly, a large part of non-monetary instruments

---

[1] This document uses the definition of *money* in its *broad sense*, that is, it refers to financial instruments contained in monetary aggregates. They consist of a total of liquid instruments of a generalized use, as a means of payment (typically banknotes and coins), plus those that can become a means of payment in a very short term, with no or minimum losses in its nominal value (such as deposit accounts payable on demand).

[2] *Money holding sectors* are sectors that use instruments defined in monetary aggregates to acquire goods and services of the economy – excluding *money issuing sectors*, such as the central bank and the institutions authorized to receive deposits, as well as sectors the spending patterns of which reacts differently from the general public–.

[3] Some monetary aggregates in Mexico also have predictive power on inflation in the short term, as illustrated in Box 4.

[4] For further detail on the construction and the composition of monetary aggregates and domestic financial assets, consult the methodological documents released by Banco de México, at the link:

http://www.banxico.org.mx/informacion-para-la-prensa/comunicados/sector-financiero/agregados-monetarios/indexpage.html

[5] See, for example, McCallum, B. T. and E. Nelson (2010): "Money and inflation: Some critical issues." In Friedman, B. and M. Woodford, Handbook of Monetary Economics. Vol. 3. Elsevier. P. 97-153.

[6] For example, U.S. Federal Reserve and the Bank of England analyze the dynamics of broad monetary aggregates, as they consider that these can provide information on the observed and expected evolution of the economy. The European Central Bank studies the evolution of its broadest monetary aggregate, M3, to evaluate if its evolution in congruent with the long-term inflation target at each point of time. See Bernanke, B.S. (2006): "Monetary Aggregates and Monetary Policy at the Federal Reserve: A Historical Perspective," address at the fourth conference of central banks (ECB); McLeay, M., Radia, A. and Thomas, R. (2014): "Money Creation in the Modern Economy," Q1 Quarterly Bulletin, Bank of England; and Papademos, L.D. and Stark, J. (2010): "Enhancing Monetary Analysis," European Central Bank.

</div>

contained in domestic financial assets are long-term fixed income instruments and variable income instruments, the market valuation of which considers economic agents' expectations of the future performance of issuers of said securities and the economy. Therefore, these indicators are expected to have a certain signal over the future economic performance as well.

Table 1
Monetary Aggregates and Domestic Financial Assets

Structure of Domestic Financial Assets (F=F2+FNR)

Instruments:
Lower transactional use/
Higher use for savings/
Mainly variable income

Instruments:
Greater transactional use/
Lower use for savings/
Mainly fixed income

F2
F1 + stock market shares and hybrid instruments

F1
M3 + compulsory saving and other instruments with a low degree of liquidity

M3
M2 + direct holding of government securities

M2
M1 + term monetary instruments
(internationally comparable)

M1
Instruments with a high degree of liquidity

FNR
MNR + stock market and hybrid instruments + …

MNR
(M4-M3)

Government securities
+
Term monetary instruments
+
Instruments with a high degree of liquidity

… + other non-monetary instruments

Held by residents

Held by non-residents

3.1 Relation with Economic Activity

To investigate whether the performance of monetary aggregates and domestic financial assets has a relation with the evolution of Mexico's economic activity, dynamic correlation exercises and Granger causality exercises between IGAE and each new aggregate were carried out.[7] For the period between January 2001 and November 2017, Table 2 presents a summary of the results. These suggest that in general both monetary aggregates, and domestic financial assets have a positive and significant correlation with economic activity in the short term.

Table 2
Relation of Monetary Aggregates and Domestic Financial Assets with Economic Activity

Aggregate	Maximum of significant dynamic correlation: aggregate - economic activity (lagged/preceding - sign)	Significant Granger causality: economic activity precedes the aggregate	Significant Granger causality: the aggregate precedes economic activity
M1	✓ (lead, +)	✓	✓
M2	✓ (lagged, +)	✓	✗
M3	✓ (lagged, +)	✓	✓
M4	✓ (lagged, +)	✓	✗
F1	✗	✗	✓
F2	✓ (lead, +)	✓	✓
FNR	✓ (lead, +)	✓	✓
F	✓ (lead, +)	✓	✓

*/ ✓ indicates the presence of a significant dynamic correlation or causality (precedence) in the Granger sense between variables at 95% of confidence, while x indicates the opposite. The two exercises were carried out at a 12-month horizon.
The correlation sign is shown in parenthesis. It is also indicated if the maximum correlation is attained with lagged or preceding economic activity.

---

[7] Granger causality test helps to determine if the performance of aggregates is useful to forecast that of the economic activity and/or vice versa. Thus, causality in the Granger sense refers to an eminently statistical concept, and does not necessarily imply a deeper causality relation.

Specifically, it stands out that:

- The narrow monetary aggregate M1 has a positive and significant relation with future economic activity. That is, its variations tend to lead those of productive activity. Some of the hypothesis that could rationalize the above are: first, that agents increase their demand for money in its most liquid form given the expectations of greater future economic activity (e.g., disinvesting in long-term financial assets to tackle input payments, payments to the work factor and the purchases of machinery and equipment that they expect to use to meet a higher demand in the future). Second, a higher current consumption of goods —which would be reflected in a higher amount of transactions of liquid financial instruments— would lead to a deaccumulation of businesses' inventories and a higher future production. Third, economic agents react to adjustments in the monetary policy stance: for example, a decrease in the benchmark interest rate would raise demand for instruments in M1, which over the following months would also lead to higher aggregate demand.

- All broad monetary aggregates are related to lagged economic activity, that is, fluctuations in productive activity precede adjustments in these aggregates. This can derive from the fact that, insofar as higher economic activity generates greater disposable income in non-financial private sector, demand for financial instruments more closely related to savings will tend to grow during the subsequent months.

- Domestic financial assets, held by both residents and non-residents (F, F2 and FNR), are significantly related to future economic activity. This would be a sign that the expected greater growth of the economy in the future would be notable as immediate increases in financial asset prices, particularly in variable-rent instruments.

Chart 1 shows the dynamic correlation of real annual changes of F and lagged/preceding IGAE for the period of study. The correlation index reaches its maximum (0.58) three months in advance, which means that positive changes in the aggregate F tend to lead changes in IGAE three months in advance.

Chart 1
IGAE (t+j) and F (t)
Dynamic correlation of real annual changes
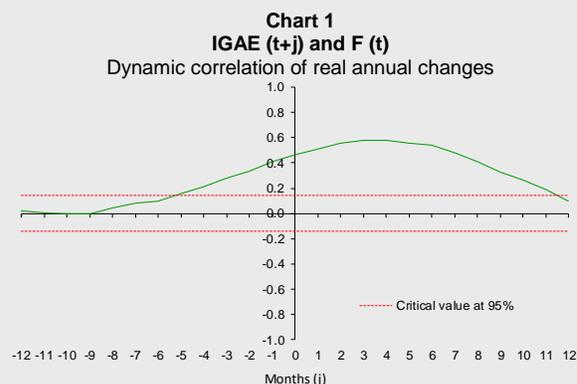
3.2 Relation with Inflation

The relation between the monetary aggregates and inflation is principally based on the quantitative theory of money, which suggests that fluctuations in the amount of money in an economy are related one to one in the long term with the changes in the price level, although in the short term deviations can be observed in this relation. Among other factors, this derives from the possible effects of money on economic activity in real terms in the short run.[8] To explore this long-term association among variables, academic empirical works generally use relatively long time series.[9] Therefore, the empirical exercises in this subsection were estimated for a sample that comprises the period from January 1995 to December 2017.

Thus, the analysis below explores the relation between long-term inflation trends and growth of monetary aggregates, using two different tools:

1. The technique suggested by Fitzgerald (1999) is used, which via a linear regression quantifies the relation between long-term trends of annual changes in monetary aggregates and inflation of the CPI. In particular, first, long-term trends of annual changes are calculated as 4-year moving averages of monetary aggregates, $\overline{\Delta\% M_t}$, and the CPI, $\overline{\Delta\% P_t}$.[10] Subsequently, the relation is measured between the variables with the estimator of the slope, β, and the statistic R^2 of the linear regression with error u_t:
$\overline{\Delta\% P_t} = \alpha + \beta \overline{\Delta\% M_t} + u_t$.

2. The spectral coherence between the annual changes in the CPI and monetary aggregates is estimated, to identify the degree of correlation between these series at a low frequency. If this coherence is high and significantly not different from one, the variables have

---

[8] See, for example, Papademos, L.D. and Stark, J. (2010): "Enhancing Monetary Analysis," European Central Bank.
[9] See Benati, L. (2009): "Long Run Evidence on Money Growth and Inflation," ECB WP 1027.

[10] Fitzgerald carries out the analysis with moving averages of 4, 6 and 8 years. 4-year moving averages were chosen to avoid lowering the statistical power of the estimates. See Fitzgerald, T.J., (1999): "Money Growth and Inflation: How Long is the Long-Run?". *Economic Commentary*. Federal Reserve Bank of Cleveland. August 1.

a similar performance in the long term; that is, they are cointegrated.[8]

Table 3 presents a summary of these exercises. In general, both estimation methods suggest a long-term correlation close to 1 between inflation and monetary aggregates growth rates.[9] In the case of M4, R^2 statistic is relatively low and the estimated spectral coherence is statistically lower than one, possibly given that this aggregate incorporates non-resident holdings of monetary instruments, which may be partially used to be spent on goods and services in the domestic economy, and, therefore, would not imply such a close link with inflation.

Table 3
Estimation of Relation between Long-term Trends

Aggregate	Fitzgerald's estimations		Spectral coherence
	β	R^2	Long-term
M1	0.82	0.91	0.86*
M2	1.07*	0.89	0.86*
M3	0.99*	0.91	0.91*
M4	0.97*	0.62	0.71

Note: β corresponds to the estimator of the slope in the regression, which is significantly different from 0 in all cases, with a significance level of 5%. The asterisk indicates that the estimated coefficient is not statistically different from 1.

4. Final Remarks

The new definition of monetary aggregates and the construction of domestic financial assets substantially improve Banco de México's statistics, as they yield information that facilitates the reading of the economy. On the one hand, new monetary aggregates more accurately measure money in its broad sense issued in Mexico, while its construction follows international standards, which makes them comparable with those used across other countries. On the other hand, aggregates of financial assets are new indicators that allow to have a broader measurement of the savings level and the degree of satisfaction in Holders' investments.

Thus, the exercises presented in this Box suggest that: i) the monetary aggregates and domestic financial assets have a short-term relation with the economic activity. In particular, it stands out that fluctuations in M1, as well as in F2, FNR and F, give a forward sign of economic activity growth over the following months; ii) growth of monetary aggregates, particularly those corresponding to resident Holders, are very highly correlated with inflation in the long term, which highlights the importance of these indicators for the monetary policy.

---

[8] To do that, the variance of each series and the covariance among them is estimated in the domino of frequencies for different periodicities. The coherence is calculated as the squared coefficient of correlation among the series in the domino of frequencies, so the statistic takes the values between 0 and 1. See Chapter 10 of Hamilton, J.D., (1994): Time Series Analysis. Princeton University Press.

[9] The results should be interpreted as unconditioned correlations, as other factors, which could affect demand for money, are not controlled for, such as interest rates or economic activity.

2.2.3.1. Total Funding of the Mexican Economy [6]

Before presenting the analysis of total funding of the Mexican economy in the period reported here, it is necessary to discuss its dynamics from a longer-term perspective. This will show the way financing has responded to the different shocks that have affected the Mexican economy since 2014. In particular, since the last quarter of that year the Mexican economy has been subject to a number of negative shocks that generally caused tighter external financing. Some of these factors were a drop in international crude oil prices in 2014 and 2015, and, subsequently, the consequences of the U.S. electoral process and its outcome on domestic financial markets, as well as the uncertainty over the monetary policy normalization process in advanced economies, in particular in the U.S. Because of these shocks, the foreign sources of financial resources of the Mexican economy dropped significantly from levels above 4 percent of GDP, on average, in 2013 and 2014, to an annual average of 1.4 percent of GDP between 2015 and 2017 (Table 1). Tighter foreign financing required an adjustment in the macroeconomic stance of Mexico, so that, on the one hand, given the current phase of the economic cycle, it would propitiate a lower absorption and would induce greater savings in the economy, thus increasing the domestic sources of financing. On the other hand, it would lead to a lower use of financial resources by the public sector, prompting a more efficient adjustment in channeling funds to different sectors of the economy, and therefore preventing the greater part of the decrease in financing from falling to productive activities and households.

In this context, the aforementioned adjustment was twofold. First, monetary policy actions implemented by Banco de México starting from the last quarter of 2015 contributed to a smooth adjustment in the loanable funds market. In particular, the tighter monetary stance maintained medium- and long-term inflation expectations anchored, strengthening the resilience of the economy to the more adverse environment, and prompted economic agents to temporarily reallocate spending, thus reducing the absorption of the economy. This generated greater financial saving, therefore increasing the supply of loanable funds. Indeed, the domestic sources of resources expanded between 2015 and 2017 from 4.6 to 6.6 percent of GDP. In particular, the monetary sources recovered –especially the instruments that constitute M2, which are the sources of funds, which financial intermediaries channel as credit into different sectors of the economy–. Consequently, the referred monetary policy actions would lead to tighter funding conditions for the users of credit. Secondly, it was important for the adjustment to affect productive activities as little as possible. In this context, a fiscal consolidation effort had been undertaken starting from 2016, which freed resources for the financial intermediaries to channel them to the private sector, thus mitigating the pressures on the respective financing costs.

---

[6] Unless stated otherwise, in this Section growth rates are expressed in real annual terms and are estimated based on balances adjusted for exchange rate and asset price variations.

Table 1
Total Funding of the Mexican Economy (Sources and Uses)

	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
	Annual flows as percent of GDP					Real annual change				
Total sources	**10.0**	**9.7**	**5.8**	**7.4**	**7.8**	**5.9**	**5.3**	**3.4**	**3.8**	**0.9**
Domestic sources (F1) [1]	5.7	5.6	4.6	5.5	6.6	5.6	5.1	5.3	5.4	3.6
Monetary [2]	3.8	3.2	2.7	3.6	4.2	6.0	4.1	4.7	5.7	3.7
Non-monetary [3]	1.9	2.4	1.9	1.9	2.3	5.0	7.0	6.3	4.9	3.4
Foreign sources [4]	4.2	4.1	1.2	1.9	1.2	6.3	5.7	0.6	1.3	-3.4
Total uses	**10.0**	**9.7**	**5.8**	**7.4**	**7.8**	**5.9**	**5.3**	**3.4**	**3.8**	**0.9**
International reserves [5]	1.0	1.3	-1.5	0.0	-0.4	0.8	2.0	-9.2	-3.5	-8.5
Public sector financing	4.1	4.7	4.2	2.8	1.1	4.6	5.7	6.3	2.4	-4.1
Federal public sector	3.7	4.5	4.0	2.8	1.1	4.3	6.0	6.5	2.6	-4.1
States and municipalities	0.4	0.2	0.1	0.1	0.1	9.1	2.5	2.9	-0.6	-4.6
Private sector financing	4.2	2.5	3.1	3.0	3.8	6.6	2.2	5.5	4.0	2.8
Domestic	2.5	1.7	3.0	3.0	3.3	5.3	2.1	8.9	7.3	4.5
Foreign	1.7	0.8	0.1	0.0	0.5	9.5	2.4	-1.6	-3.5	-1.7
Other [6]	0.7	1.2	0.1	1.6	3.2	n.s.	n.s.	n.s.	n.s.	n.s.

Note: Annual flows are expressed in percent of average annual nominal GDP.
1/ It corresponds to the aggregate of domestic financial assets F1, which includes the monetary aggregate M3 plus other instruments held resident money-holding sectors that are not considered in monetary aggregates.
2/ It refers to financial instruments included in the monetary aggregate M3, which is composed of M2 plus Federal Government securities, Banco de México's securities (BREMS) and IPAB securities held by resident money-holding sectors.
3/ They include housing and pension saving funds, private securities, other public securities and other bank liabilities (debt securities issued by banks with a remaining term of over 5 years and subordinated obligations).
4/ It includes the monetary aggregate M4 held by non-residents (the difference between the monetary aggregate M4 and M3), foreign financing to the federal government, public institutions and enterprises, commercial banks' foreign liabilities, foreign financing to the non-financial private sector, deposits by agencies and other non-monetary instruments held by non-residents.
5/ As defined by Banco de México's Law.
6/ It includes capital accounts, and results and other assets and liabilities of commercial and development banks, non-bank financial intermediaries, of the National Housing Fund (Infonavit) and Banco de México –including the securities issued by this Central Institute for the purposes of monetary regulation, especially those related to neutralizing the monetary impact by the operational surplus–. Similarly, it includes non-monetary liabilities from the Institute for the Protection of Bank Savings (IPAB), as well as the effect of the change in the valuation of public debt instruments, among other concepts.
Source: Banco de México.

In this context, there was a lower availability of external financial resources in 2017. The relative share of domestic sources increased as compared to the previous year, although its growth rate in real terms subsided, as a result of the higher observed inflation in 2017 (Chart 25a). The lower use of financial resources by the public sector is noteworthy, as it mitigated the deceleration in the use of resources by the private sector (Chart 25b).

Chart 25
Total Funding of the Mexican Economy (Sources and Uses)
Real annual change in percent $^{1/}$

a) Sources

b) Uses
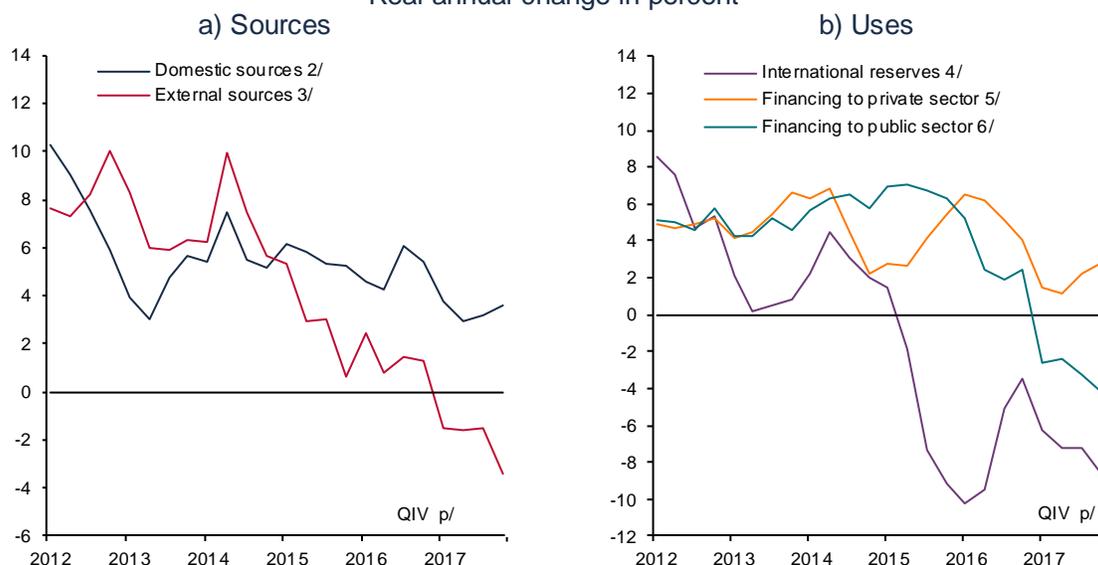
p/ Preliminary data.
1/ Real annual changes are calculated based on balances adjusted due to exchange rate and asset price variation.
2/ It is equivalent to the aggregate of domestic financial assets F1, which includes the monetary aggregate M3 plus other non-monetary instruments held by resident money-holding sectors. They include housing and pension saving funds, private securities, other public securities and other bank liabilities.
3/ It includes the monetary aggregate M4 held by non-residents (the difference between the monetary aggregate M4 and M3), foreign financing to the federal government, public institutions and enterprises, commercial banks' foreign liabilities, foreign financing to the non-financial private sector, deposits by agencies and non-monetary instruments held by the external sector.
4/ As defined by Banco de México's Law.
5/ It refers to the total portfolio of financial intermediaries, of the National Housing Fund (*Instituto del Fondo Nacional de la Vivienda para los Trabajadores*, Infonavit), and of the ISSSTE Housing Fund (*Fondo de la Vivienda del ISSSTE*, Fovissste), the issuance of domestic debt and external financing.
6/ It includes financing to the federal public sector, as well as financing to states and municipalities.
Source: Banco de México.

In the analyzed quarter, domestic sources of financial resources of the economy –measured by the aggregate of domestic financial assets F1– grew at a real annual rate of 3.6 percent, which compares to 3.2 percent in the previous quarter (Chart 26a). This greater growth rate resulted, in part, from higher resident holdings of term monetary instruments included in M2, instead of more liquid instruments (Chart 26b). In an environment of higher market interest rates, higher relative yields of term assets contributed to the above. Similarly, the favorable evolution of non-monetary instrument holdings, particularly retirement savings funds, also contributed to higher domestic sources (Chart 26a). This is attributed to a higher contribution by siefores (Investment Companies Specialized in Retirement Savings), reflecting the persistent dynamism of formal employment as well as capital gains in investment portfolios.

In contrast, the external sources of resources –that include monetary instruments held by non-residents, as well as residents' liabilities with the external sector- registered a 3.4 percent contraction in real annual terms in the reference quarter, which is a larger contraction than the 1.6 percent registered in the previous quarter (Chart 26c). This mainly derived from a lower investment in monetary instruments by non-residents –in particular government debt securities–, as well as lower indebtedness of the public sector in foreign currency.

Chart 26
Sources of Financial Resources [1]

a) Domestic Sources (F1) [2] Real annual change in percent	b) Monetary Aggregate M2 Real annual change in percent	c) External Sources Real annual change in percent and contribution to growth
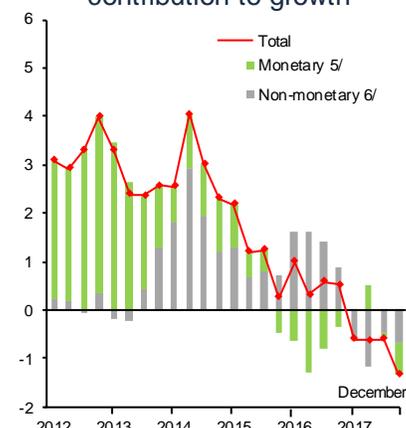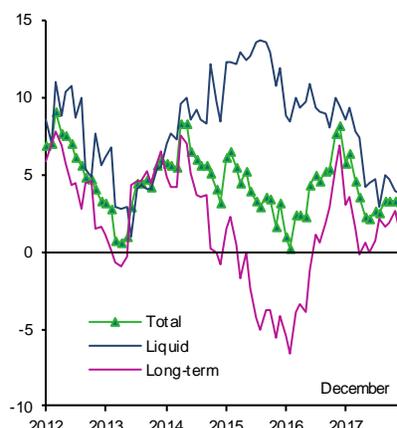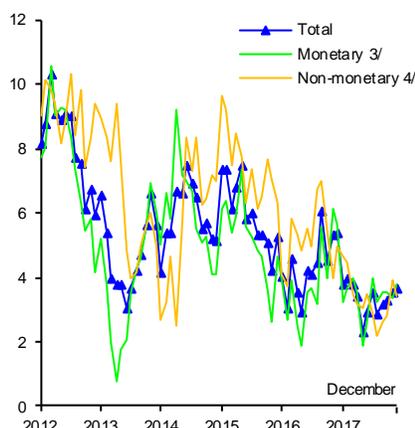
1/ Real annual changes are calculated based on balances adjusted due to exchange rate and asset price variations.
2/ It corresponds to the aggregate of domestic financial assets F1, which includes the monetary aggregate M3 plus other instruments held by resident money-holding sectors, what are excluded from monetary aggregates.
3/ It refers to financial instruments included in the monetary aggregate M3, which is composed of M2 plus Federal Government securities, Banco de México's securities (BREMS) and IPAB securities held by resident money-holding sectors.
4/ It includes housing and retirement savings funds, private securities and other public securities and other bank liabilities.
5/ Total monetary instruments held by non-residents, which is equivalent to the difference between the monetary aggregate M4 and the monetary aggregate M3.
6/ It includes the external debt of the federal government, public entities and firms, and external PIDIREGAS, external liabilities from commercial banks, excluding non-residents' deposits, foreign financing to the non-financial private sector and other residents' liabilities in the external sector.
Source: Banco de México.

Regarding the use of financial resources of the economy, financing to the public sector declined in real annual terms, in response to the fiscal adjustment implemented by the Federal Government. The balance of international reserves contracted in real annual terms, which was the consequence of the fact that, unlike in previous years, Pemex did not sell dollars to Banco de México in 2017, which reflected the deterioration in the oil trade balance. In addition, unlike over the previous three years, the net flow of foreign exchange operations of Banco de México with the Federal Government in 2017 was negative.

In the fourth quarter of 2017 total financing to the non-financial private sector continued to expand at a moderate real annual rate (2.8 percent; Chart 27a). However, its components evolved with a certain heterogeneity. On the one hand, domestic financing to firms maintained relatively high rates (6.7 percent), derived from the dynamism of the domestic debt market, and the sustained expansion of commercial bank credit to larger firms (Chart 27b and Chart 28). The above largely reflects that these firms –that have a greater access to different sources of financing– have been substituting both external financing for domestic one, and lower liabilities with development banks for commercial banks' credit. This suggests a lower investment spending, in which development banks usually partake, and greater refinancing of liabilities, an activity usually served by commercial banks. In this respect, the Survey on General Conditions and Standards in the Banking Credit Market (EnBan) carried out by Banco de México shows that commercial banks' directors perceived that during 2017 large firms' demand for credit expanded, even

though credit supply conditions in this segment tended to tighten.[7] In contrast, credit granted to small and medium-sized enterprises moderated substantially in 2017, both due to a smaller demand for credit and to tighter lending conditions. In this period, the costs of financing remained above those registered in 2016. This partly reflects the increases in Banco de México's target for the Overnight Interbank Interest Rate. In this respect, the impact tends to be greater among those that are funded at a variable rate and among the marginal credit users. The delinquency rates of credit portfolios to firms remained low and stable (Chart 29).

Chart 27
Financing to Non-financial Private Sector
Real annual change in percent
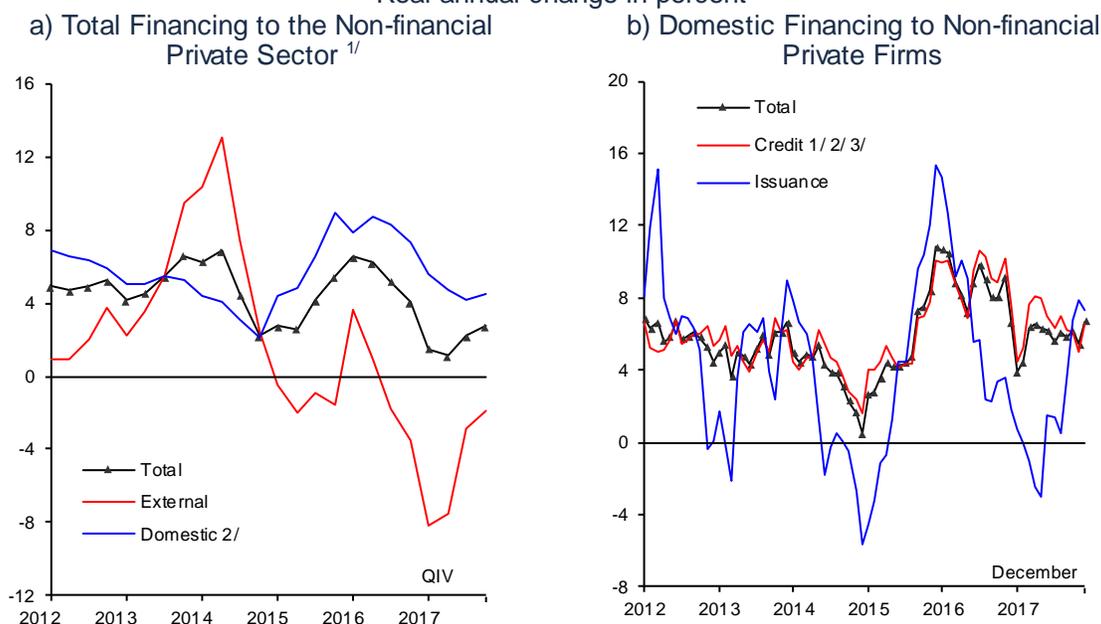
a) Total Financing to the Non-financial Private Sector [1/]

b) Domestic Financing to Non-financial Private Firms

1/ Real annual changes are calculated based on balances adjusted due to exchange rate variations.
2/ These data are adjusted due to the withdrawal from and the incorporation of some financial intermediaries to the credit statistics.
3/ It refers to the performing and non-performing portfolios, and includes credit from commercial and development banks, as well as other non-bank financial intermediaries.
Source: Banco de México.

Credit to households continued growing at a moderate rate (2.5 percent; Chart 30a). Within it, the dynamism of housing credit has been decreasing since the fourth quarter of 2016, which largely reflects a lower demand for housing credit which has been observed since that quarter (Chart 30b). This would also reflect, to a lower degree, tighter supply conditions, which is consistent with the slight increase in long-term interest rates. Meanwhile, the corresponding delinquency rates remained low and stable (Chart 30c).

---

[7]   For more detail, see the press release of the Survey on General Conditions and Standards in the Banking Credit Market during the quarter October – December 2017, available at the following link: http://www.banxico.org.mx/informacion-para-la-prensa/comunicados/resultados-de-encuestas/encuesta-sobre-condiciones-generales-y-estandares-/condiciones-en-credito-bancar.html.

Chart 28
Domestic Financing to Non-financial Private Firms

a) Net Placement of Medium-term Securities [1]
MXN billion
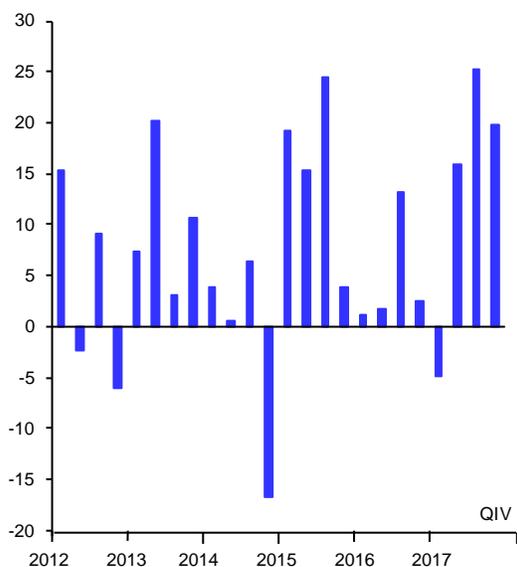
b) Performing Credit [2]
Real annual change in percent
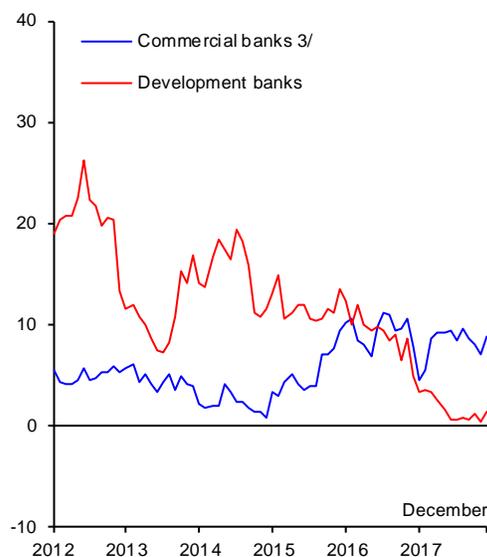
1/ Placements excluding amortizations (maturities and prepayments) in the quarter.
2/ Real annual changes are calculated based on the balance adjusted due to exchange rate variations.
3/ It includes Sofomes ER subsidiaries of bank institutions and financial groups. Data are adjusted so as not to be affected by the transfer of bridge loans.
Source: Banco de México.

Chart 29
Annual Interest Rates and Delinquency Rates of Non-financial Private Firms

a) Interest Rates of Private Securities
Quarterly average in percent
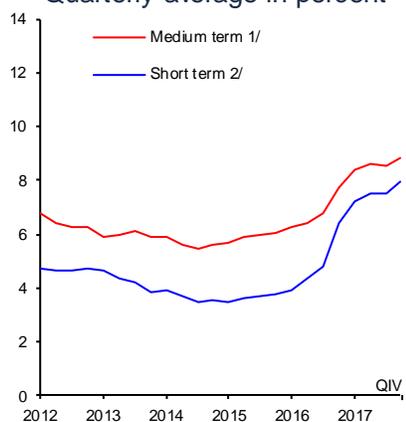
b) Interest Rates of New Credits [3]
Quarterly average in percent
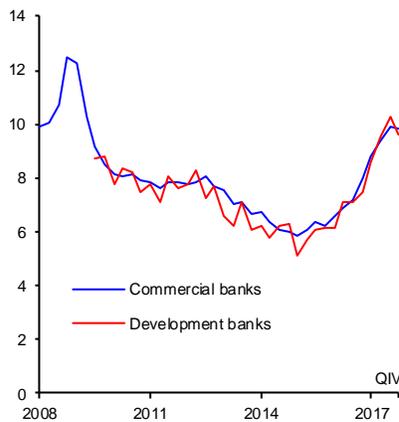
c) Delinquency Rates
Percent
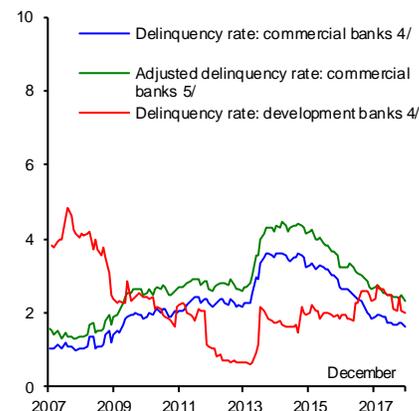
1/ Average weighted yield to maturity of issuances in circulation, with a term over 1 year, at the end of the month.
2/ Average weighted rate of private debt placements, at a term of up to 1 year, expressed in a 28-day curve. It only includes stock exchange certificates.
3/ It refers to the interest rate of new bank credits to non-financial private firms, weighted by the associated stock of the performing credit and for all credit terms requested.
4/ The delinquency rate is defined as the stock of non-performing loans divided by the stock of total loans.
5/ The adjusted delinquency rate is defined as the non-performing portfolio plus debt write-offs accumulated over the last 12 months divided by the total portfolio plus debt write-offs accumulated over the last 12 months.
Source: Banco de México.

Finally, consumer credit has continued to decelerate across practically all its components (Chart 31a). This lower dynamism is in part associated to: i) the

deceleration of labor share, ii) a lower demand for credit to acquire consumer durables, which strongly rebounded last year; and iii) higher costs of financing, especially in credit cards, although this type of financing has already been characteirzed by high interest rates. In line with the above, the EnBan results suggest that since late 2016 and during most of 2017 consumer credit supply conditions tightened, while demand for consumer credit lowered, particularly in the credit card segment. In this context, delinquency rates adjusted for write-offs somewhat deteriorated (Chart 31b and Chart 31c).

Chart 30
Credit to Households

a) Total Credit [1] Real annual change in percent	b) Performing Housing Credit Real annual change in percent	c) Annual Interest Rate of New Credits and Delinquency Rates of the Housing Credit In percent
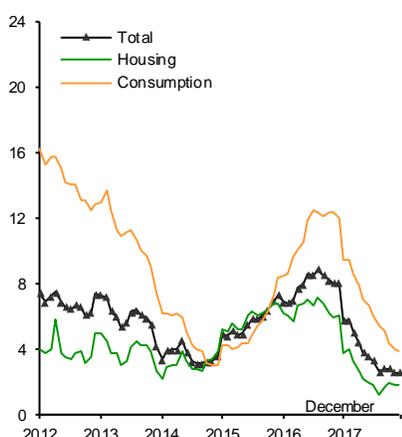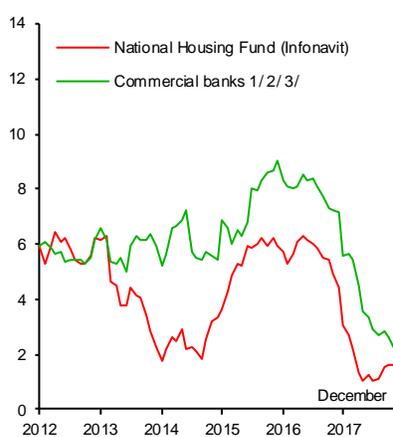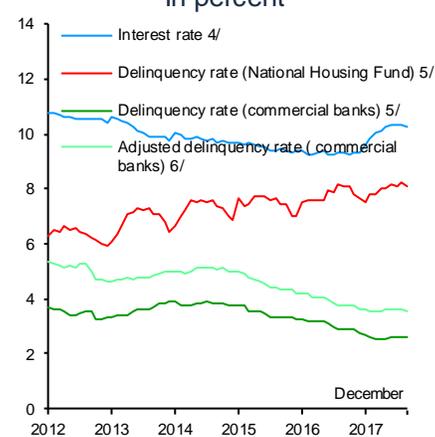
1/ These data are adjusted due to the withdrawal from and the incorporation of some financial intermediaries to the credit statistics.
2/ It includes the Sofomes ER subsidiaries of bank institutions and financial groups.
3/ Figures are adjusted in order to avoid distortions by the transfer and the reclassification of direct credit portfolio, by the transfer from the UDIS trust portfolio to the commercial banks' balance sheet and by the reclassification of direct credit portfolio to ADES program.
4/ The interest rate of new housing credits from commercial banks, weighted by the balance associated to the performing credit. It includes credit for acquisition of new and used housing.
5/ The delinquency rate is defined as the stock of non-performing loans divided by the stock of total loans.
6/ The adjusted delinquency rate is defined as the non-performing portfolio plus debt write-offs accumulated over the last 12 months divided by the total portfolio plus debt write-offs accumulated over the last 12 months.
Source: Banco de México.

Considering the above and given the possibility that tight financial conditions could persist and external financial resources could remain limited throughout 2018, it is key for the fiscal consolidation efforts that have been undertaken by the Federal Government to continue. This, in addition to strengthening the macroeconomic framework of Mexico, will extend the financial sector's ability to continue channeling resources to the private sector, even in an environment of tight financial conditions.

Chart 31
Commercial Bank Consumer Credit

a) Performing Credit [1/]
Real annual change in percent

b) Delinquency Rates [1/ 4/]
In percent

c) Adjusted Delinquency Rates [1/ 5/]
In percent
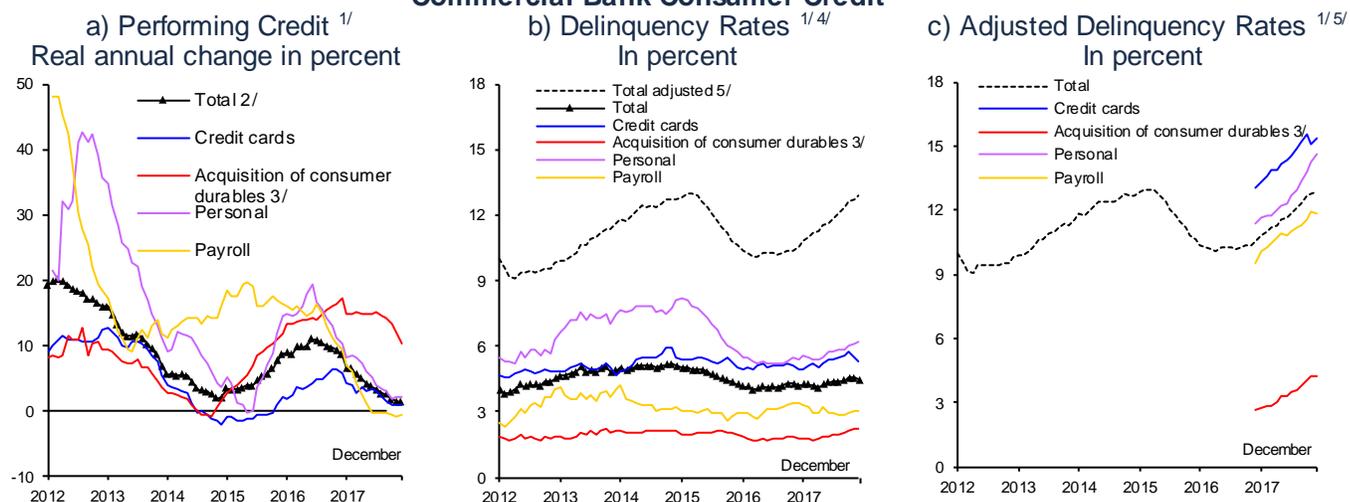
1/ It includes the Sofomes ER subsidiaries of bank institutions and financial groups.
2/ It includes credit for payable leasing operations and other consumer credits.
3/ It includes auto loans and credit for acquisition of other movable properties.
4/ The delinquency rate is defined as the stock of non-performing loans divided by the stock of total loans.
5/ The adjusted delinquency rate is defined as the non-performing portfolio plus debt write-offs accumulated over the last 12 months divided by the total portfolio plus debt write-offs accumulated over the last 12 months.
Source: Banco de México.

2.2.3.2. Domestic Financial Assets

Total domestic financial assets, referred to as F, in accordance with the new statistics, is composed by the stock held by money-holding sectors (residents and non-residents) of the monetary instruments (M4), savings funds for housing and retirement, other debt instruments, and equity and hybrid instruments.[8] As detailed in Box 3, changes of the market value balance of this indicator seem to give signals of the future evolution of Mexico's economic activity, largely because market prices of stock-market shares and other instruments included in F consider the information of the expected evolution of the economy. In this context, this aggregate presented a relatively low dynamism in 2017, although its growth rate rebounded slightly over the last months of the year. Indeed, between the third and the fourth quarters of 2017, its real annual rate went up from 2.4 to 3.5 percent (Chart 32). In accordance with the statistical evidence, changes in this aggregate reach a maximum, positive, significant correlation with those of the economic activity one quarter later. That is, changes in this aggregate tend to precede economic activity. Thus, its recent acceleration could indicate a possible higher growth rate of the economy in the future.

---

[8] As defined in the press release on Monetary Aggregates and Financial Activity in December 2017, the aggregate F represents the broadest measure of financial instruments issued in Mexico held by money-holding sectors in the broad sense. For more details, consult the referred press release and the methodological documents that refer to the redefinition of monetary aggregates and the construction of domestic financial assets, available on the following link: http://www.banxico.org.mx/informacion-para-la-prensa/comunicados/sector-financiero/agregados-monetarios/indexpage.html.

Chart 32
Domestic Financial Assets (F) [1]
Real annual change in percent [p]
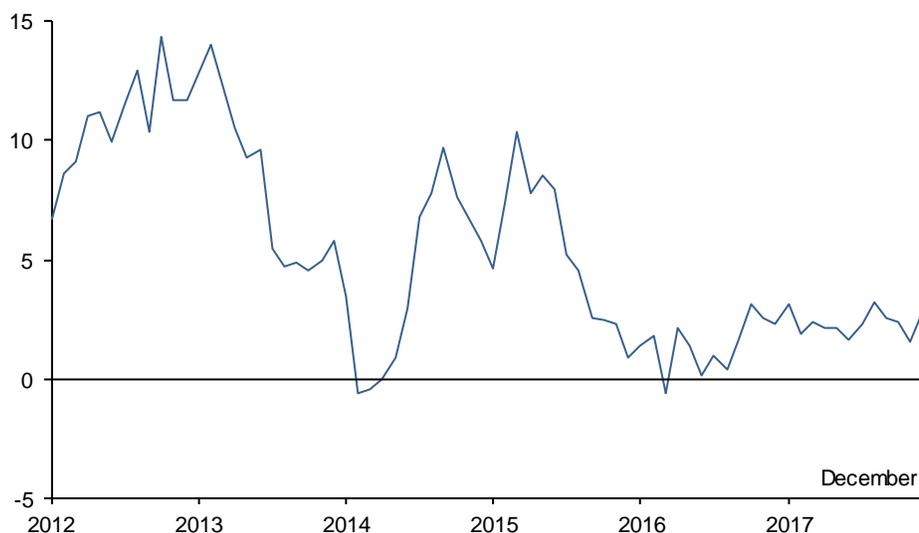
p/ Preliminary figures.
1/ It refers to total aggregates of domestic financial assets held by residents and non-residents, F2 and FNR. It includes the monetary aggregate M4 plus balances held by money-holding sectors in broad sense: securities issued by private firms, states and municipalities, entities of direct and indirect budgetary control, state and Fonadin (National Infrastructure Fund) productive companies; housing and retirement savings funds; other bank liabilities; and equity and hybrid instruments.
Source: Banco de México.

2.2.4. Slackness Conditions of the Economy

To conduct monetary policy, it is essential to have a proper reading of the conditions of slack in the economy and to assess the phase of the economic cycle it is going through. This allows the timely identification of the possible presence of inflation pressures derived from aggregate demand and from input markets, as well as the ability to assimilate possible shocks on inflation.

It should be noted that the Mexican economy has been going through an atypical economic cycle for several years, caused by the impact of unprecedented external economic conditions, as well as by the type of shocks that have affected it. This has made the assessment of cyclical conditions more difficult, particularly the assessment of slack conditions in the economy and their role in price formation. Thus, to have a comprehensive reading of the cyclical position of the Mexican economy that informs the monetary policy decision-making process, it has been decided that, from this Report onward, an additional set of slack indicators should be included as part of the monitoring of Mexico's economic environment, complementing those that have been previously and periodically reported. In particular, four slack indices are presented, based on the respective indicators of consumption, economic activity and demand, labor market conditions and demand in the loanable funds market, which derive from a selection of economic variables that presumably are associated with slack conditions in the goods' and inputs' markets and have predictive power on inflation (see Box 4). The results of this analysis suggest that slack conditions have been tightening, especially in the labor market and in relation to consumption, although in general they seem to have started to relent moderately.

Box 4
Slack Indicators to Identify Inflation Pressures

1. Introduction

To make the assessment of the degree of slackness in the economy more comprehensive and solid, it can incorporate a comprehensive approach that considers the information contained in a broad range of indicators. In principle, an indicator is assumed to show slack when its observed level is below its potential level (defined as the level consistent with stable inflation), thus indicating a contribution to a lower inflation. In contrast, when the observed level of the indicator is above its potential level, it signals inflation pressures.[1]

In this context, in order to have a better understanding of slack conditions in the Mexican economy, this Box presents the results of a statistical exercise that estimates slack conditions based on a set of variables that have shown to have predictive power on the inflation evolution, and that are related to consumption, economic activity and aggregate demand, the labor market and demand conditions in the loanable funds market. Although this exercise indicates that evaluating slack requires following up on a number of indicators, the estimated slack indices are introduced using a Principal Components method in order to synthesize the information (a monthly aggregate, a quarterly aggregate and four aggregates, one for each one of the indicator groupings).

2. Methodology and Estimates

The exercise was carried out in several steps, with the objective of reducing a broad initial set of indicators that could contain information on slackness conditions into a more limited set of variables that would outperform the rest in terms of its predictive power on inflation.[2]

The first step to limit the number of indicators consisted in realizing Granger causality tests between each indicator of slack and inflation. Thus, only those indicators that Granger-caused inflation remained. In the second stage, a Hybrid Phillips Curve (HPC) was estimated for each

indicator that passed the first stage. The specification of each HPC was the following:[3]

$$\pi_t = \beta(L)H_{t-1} + \gamma\pi_{t-1}^{exp} + \rho(L)\pi_{t-1} + \tau(L)\Delta s_{t-1}$$
$$+ \delta(L)\pi_{t-1}^{imp} + \boldsymbol{\theta}'\boldsymbol{Z_t} + \varepsilon_t. \tag{1}$$

Where:
π_t = headline inflation,
H_t = one of the measures of slack,
π_t^{exp} = measure of inflation expectations,[4]
Δs_t = depreciation of the nominal MXN/USD exchange rate,
π_t^{imp} = measure of external inflation (e.g. imports prices, oil prices and inflation in the U.S.),
$\boldsymbol{Z_t}$ = vector of internal controls (e.g. inflation in telecommunications, electricity and gasoline prices), and
ε_t = error term.

Parameters γ, $\boldsymbol{\theta}$ and lag polynomials $\beta(L)$, $\tau(L)$, $\rho(L)$ and $\delta(L)$ were estimated with a procedure of minimum least squares.[5] Upon estimating this model, it was verified that the coefficients $\beta(L)$ associated to the measure of slack were statistically significant and had the correct sign in accordance with the economic theory. In this way, those indicators for which the HPC model met these two requirements were chosen, and the rest were dismissed. In this way, a more limited number of indicators was obtained.

In the third stage, the predictive power of all models that passed the second stage on inflation was evaluated. To do that, the Model Confidence Set (MCS) procedure was used, which, via an iterative process discards those models whose predictive power is statistically lower relative to the rest, to obtain an irreducible set of models.[6] To implement this procedure, first, recursive inflation forecasts were generated for different horizons, for each one of the models that were chosen at the second stage. Subsequently, a hypothesis test was realized, seeking to identify from a statistical point of view the differences among the forecasts generated for each HPC model. In particular, the null hypothesis states that there is no difference between the forecasts derived from a specific

---

[1] To standardize the reading of slack, indicators such as the unemployment gap are multiplied by (-1), so that, as with other indicators, a positive gap indicates upward inflation pressures.

[2] All indicators were analyzed as a gap with respect to the potential level. In particular, potential levels were calculated using a Hodrick-Prescott filter with tail corrections and using a historic average to determine the correction parameter. For the specific case of the output gap, see Banco de México (2009) and for the estimation of NAIRU, see Banco de México (2016). Given that some indicators are available on a monthly basis and some on a quarterly basis, the analysis of each frequency was carried out separately.

[3] Equation (1) can be considered a hybrid specification of the Phillips curve that has different versions; the curve with expectations, the original Phillips curve, and Gordon triangle model (1990). In all estimations, lagged values of inflation expectations were used, see Mavroeidis et. al. (2014). All data were seasonally adjusted.

[4] Both the expectations from the Survey of Professional Forecasters conducted by Banco de México and those from the Citibanamex survey were tested. The results were not significantly different.

[5] For each considered independent variable, equation (1) was estimated following the procedure from the general to the specific, using the Schwarz information criterion to determine the number of lags and independent variables, π_t^{imp} and $\boldsymbol{Z_t}$, to be included in each specification. In particular, a maximum of 6 lags was considered for monthly data and of 8 lags for quarterly data. In all tests, a 90% confidence level was used.

[6] The MCS procedure has a series of appropriate characteristics. (i) It can be estimated in rolling-window samples, which guarantees that the results are robust at different periods of analysis. (ii) It allows to obtain a superior set of models when there is no single model that is dominant in terms of predictive power. (iii) Unlike alternative tests, it is not necessary to choose a reference model. See Hansen et. al. (2011).

HPC model and an average forecast calculated using the rest of HPC models. The models for which the null hypothesis was rejected were ruled out and those models, for which the null hypotheses was not rejected, remained. In this way, a superior set of models was obtained (MCS1). At the end of the iterative process, all models that are part of MCS1 had, from a statistical point of view, the same ability to predict inflation.[7]

To have a better understanding of slack conditions, the indicators contained in MCS1 were grouped in sets related to: i) consumption, ii) economic activity and aggregate demand, iii) labor market and iv) demand conditions in the loanable funds market. For each group, the MCS procedure was applied individually again. The procedure was modified to evaluate the predictive power of each indicator with respect to each element in the respective group.[8] That is, within each group the hypothesis test was applied again for each model and those in which the null hypothesis was rejected were eliminated. This resulted in an MCS by group. That is, within each group only indicators with the same predictive power on inflation, from a statistical point of view, remained. Finally, to further reduce the final set of indicators, in each group only those that had the predictive power for all analyzed forecast horizons where chosen.

3. Results

At the beginning, 38 indicators for the monthly frequency and 38 for the quarterly frequency were considered. After applying the tests of the three stages described above, 11 indicators of monthly frequency and 12 indicators of quarterly frequency, respectively, were obtained.[9] Table 1 enumerates, by group and by frequency, the indicators with the greatest predictive power on inflation in this exercise.[10] There are a total of 23 slack indicators, 20 of which are unique and three appear both with a quarterly and a monthly frequency.

4. Slack Indices

As can be seen, for each frequency, the statistical exercise selected over a dozen variables with predictive power on inflation, which suggests that the reading of slack conditions in an economy has a multidimensional

character and should adopt a comprehensive approach that considers indicators of consumption, economic activity and aggregate demand, labor market and demand conditions in the loanable funds market. To synthesize the information provided by these indicators, a number of slack indices were estimated via the Principal Components method in order to report on the presence or the absence of inflation pressures. Specifically, the first Principal Component was used as a slack index, as it summarizes the information contained in the selected set of slack indicators.[11]

In particular, a slack indicator was estimated for the full set of monthly frequency indicators and another one for the quarterly frequency indicators (see Section 2.2.4.1). In addition, based on chosen indicators, slack indices were estimated for each group of variables related to consumption, economic activity and aggregate demand, labor market, and demand conditions in the loanable funds market.

---

[7] To implement the MCS procedure, a quadratic loss function was chosen (the root mean square error was calculated) and the statistic $T_{max,\mathcal{M}}$ was used, which compares the predictive power of each slack indicator with the average predictive power of the rest of indicators. See Hansen, et. al. (2011) for more details.

[8] In the second implementation of MCS, statistic $T_{R,\mathcal{M}}$ was used, which, for example, compares the predictive power of each consumption indicator contained in MCS1 with the rest of consumption indicators, one at a time. See Hansen, et. al. (2011) for further details.

[9] Monthly frequency forecasts correspond to monthly inflation, while quarterly frequency forecasts refer to average inflation in the quarter.

[10] 25 monthly indicators and 28 quarterly indicators satisfied Granger causality tests at stage 1; out of which 19 monthly and 25 quarterly indicators met the selection criteria of stage 2. For stage 3, the MCS

procedure for monthly indicators was based on a moving average of 48 observations in a sample that covers the period from 2007M7 to 2017M9, while for quarterly indicators it was based on a moving window of 36 observations in a sample that covers the period from 2003Q1 to 2017Q3. The predictive power of dynamic forecasts models was evaluated using the observed values of independent variables (pseudo out-of-sample forecast) for 6- and 12-month horizons in the case of monthly indicators, and of 1-, 2- and 4-quarter horizons in the case of quarterly ones. This stage selected an MCS set of 19 monthly and 22 quarterly indicators, which was limited to 11 and 12, respectively, when the MCS procedure and the predictive capacity criterion was applied again in all horizons.

[11] For more details, see Johnson and Wichtern (2012).

Table 1
Selection of Slack Indicators

Selection	
20 slackness indicators	Frequency
Index of total ANTAD sales	M
Indicator of private consumption in the domestic market:	
- Total	M
- Goods (domestic)	M
- Goods and services (domestic)	M, Q
- Services	M
Proportion of vehicles (financed units)	M
Private consumption	Q
Manufacturing GDP excluding oil **	Q
GDP excluding oil industry *	Q
Aggregate demand	Q
Domestic demand	M
Unit labor costs in the manufacturing industry	M
Rate of unemployment (NAIRU)	M, Q
Rate of unoccupied hours	M, Q
Financing:	
- Total to non-financial private sector	Q
- Total to firms	Q
- Domestic to households	Q
Domestic financial asset F1	M
Monetary aggregates:	
- M1	Q
- M2	Q

Note: M and T refer to the measurements at monthly and quarterly frequency, respectively. * GDP excluding oil and gas extraction, and mining-related services, as well as oil and carbon derivatives. ** Manufacturing GDP excluding oil and carbon derivatives. The indicators are listed by name, although in all cases the estimations refer to each variable's gap with respect to its estimated potential level. The variables of consumption, economic activity and aggregate demand, labor market and demand conditions in the loanable funds market are distinguished by blue, red, grey and green colors, respectively.

Although the estimated slack indices facilitate the reading of information contained in a broad number of indicators, it is important to keep in mind that all econometric procedures are subject to a certain degree of statistical uncertainty. Therefore, the reading of slack conditions in an economy should not depend on a sole indicator or index, nor on its absolute value. On the contrary, it should maintain a comprehensive approach, based on a broad set of variables that yield information on the phase of the economic cycle. Likewise, it should consider that its estimation is subject to uncertainty.

3. Final Remarks

This Box presented an econometric exercise that allows the identification, based on a broad range of economic indicators, of those with a greater predictive power on the future evolution of inflation. This allows a broader reading of slack conditions in Mexican economy. Similarly, based on these indicators, a number of slack indices were estimated via the Principal Components method to synthesize the findings and, thus, to facilitate the reading

of their role in the price index dynamics. The results of this analysis suggest that slack conditions have been tightening, although, at the margin, these conditions could be moderately receding.

References

Banco de México (2009). "Box 3: Potential Output and Output Gap" *Inflation Report April - June 2009,* p. 74.
      (2016). "Box 3: Considerations on the Recent Evolution of NAIRU and Slackness in the Mexican Labor Market" *Quarterly Report October - December 2016,* p. 45.

Gordon, R. J. (1990). "U.S. Inflation, Labor's Share, and the Natural Rate of Unemployment", In König, H. (Editor) *Economics of Wage Determination*, Springer-Verlag.

Hansen, P. R., A. Lunde y J. M. Nason (2011). "The Model Confidence Set", *Econometrica.* 79(2), p. 453-497.

Johnson, R. A. and D. W. Wichern, D. W. (2012). *Applied Multivariate Statistical Analysis*, (6th Edition), Phi Learning Private Limited.

Mavroeidis, S., M. Plagborg-Møller and J. H. Stock (2014). "Empirical Evidence on Inflation Expectations in the New Keynesian Phillips Curve", *Journal of Economic Literature.* 52(1), p.124 -188.

2.2.4.1. Slack Indicators

The estimate of the GDP gap that is traditionally presented in this Report remained close to zero, suggesting that the economy is currently operating close to its potential (Chart 33a). The estimate of the GDP gap that excludes the oil sector points to tighter conditions, given that it remained on the positive side in 2017, although at lower levels than in 2016 and not significantly different from zero (Chart 33b).[9] The latter is consistent with the analysis of the phase of the economic cycle of the Mexican economy that is based on a larger number of indicators, which suggests that, although in late 2015 and 2016 slack conditions were tightening and marked positive levels, over the last months these have declined slightly, despite remaining relatively tight. In particular, the more aggregated indices suggest a lack of slack conditions, although at the margin these have stopped tightening and could be relaxing (Chart 34a and Chart 34b). Indeed, although slack indicators of consumption and the labor market remain tight (Chart 35a and Chart 35b), those derived from more aggregate indicators of activity and demand have started to approach zero again, and those derived from the indicators of the demand conditions in the loanable funds market have started to turn negative again (Chart 35c and Chart 35d). On balance, although during 2017 slack conditions in the economy were tightening, which could be affecting the pace at which core inflation is declining, at the margin these conditions seem to have started to revert moderately, except for the labor market.

---

[9] The GDP gap excluding the oil sector allows to better identify the balance of aggregate demand and supply of the economy, as it is based on the consideration that the loss of production capacity in the oil industry, which has prevailed for a number of years, is essentially a supply side issue.

Chart 33
Output Gap Estimate [1]
Percentage of potential output, s. a.

a) Gross Domestic Product

b) Gross Domestic Product Excluding the Oil Sector [4]
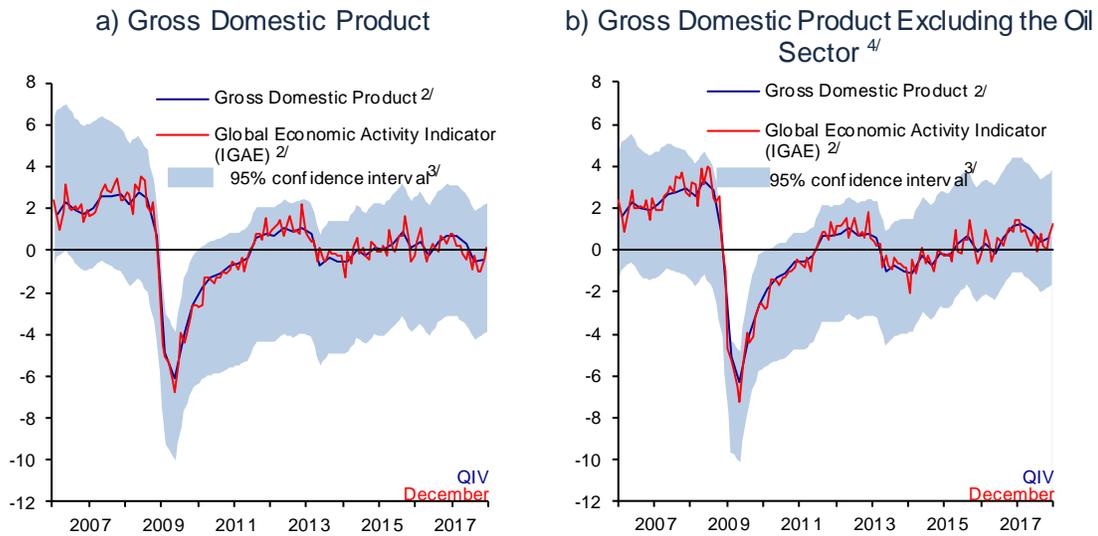
s. a. / Estimated with seasonally adjusted data.
1/ Estimated using the Hodrick-Prescott (HP) filter with tail correction; see Banco de México Inflation Report, April- June 2009, p.69.
2/ GDP figures as of the fourth quarter of 2017, IGAE figures as of December 2017.
3/ Confidence interval of the output gap calculated with an unobserved components' method.
4/ GDP excluding oil and gas extraction, excluding mining-related services and those derived from oil and carbon.
Source: Prepared by Banco de México with data from INEGI.

Chart 34
First Principal Component by Frequency of the Indicators [1]
Percent

a) Monthly
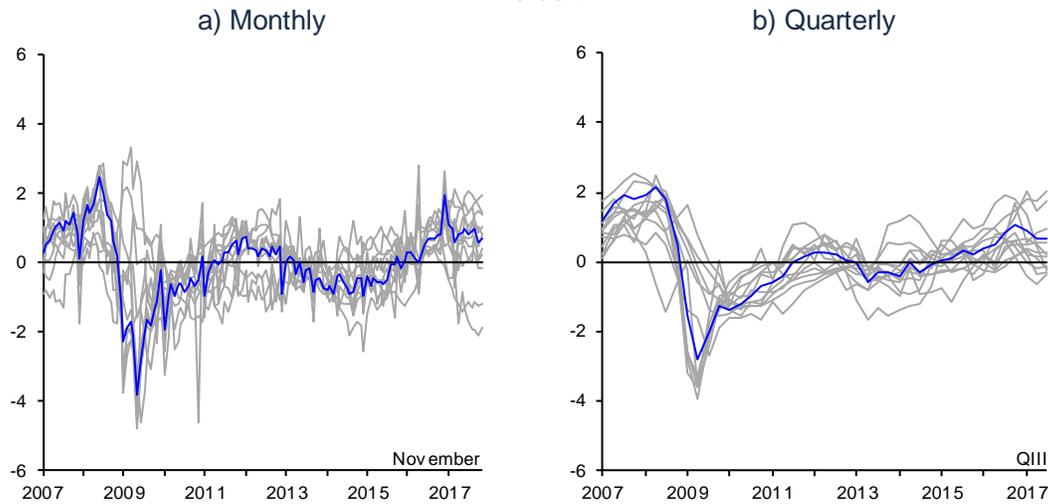
b) Quarterly

1/ The constructed indices are based on the MCS methodology; see Box 4. Monthly and quarterly slack indices are based on the first principal component of the sets comprising 11 and 12 indicators, respectively. The first component represents 51% and 58% of the joint variation of monthly and quarterly indicators, respectively. Grey lines correspond to individual slack indicators used in the principal components analysis.
Source: Estimated with data from INEGI and Banco de México.

Chart 35
First Principal Component by Group of Indicators [1]
Percent

a) Consumption

b) Labor Market

c) Economic Activity and
Aggregate Demand

d) Demand Conditions in the Loanable
Funds Market
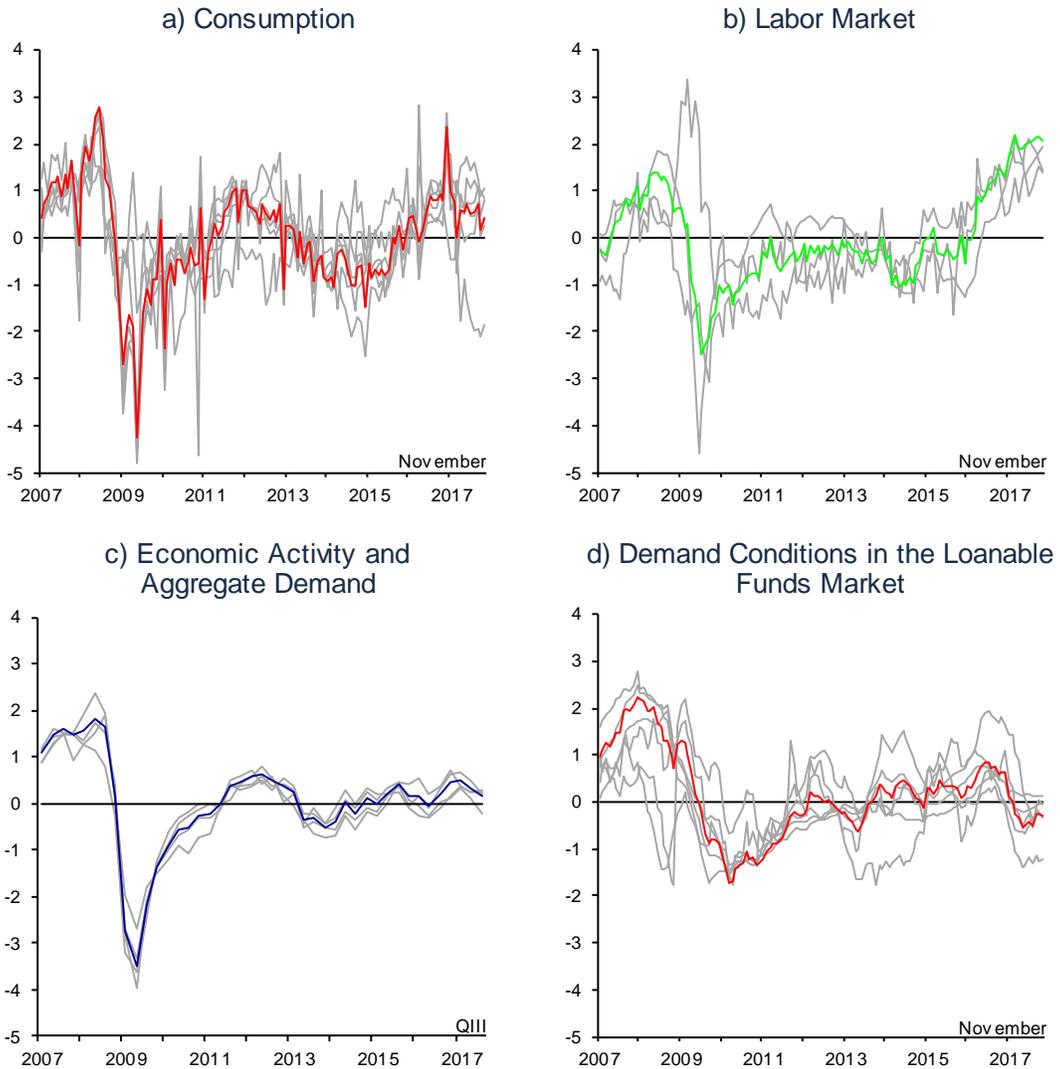
1/ The constructed indices are based on the MCS methodology; see Box 4. The slack indices related to consumption, labor
market, economic activity and financial conditions are based on the first principal component of sets comprising 6, 3, 4, and 6
indicators, respectively. The first principal component represents 63%, 55%, 95% and 57% of the joint variation of the indicators
of consumption, labor market, economic activity and aggregate demand, and the demand conditions in the loanable funds
market, in the same order. The indices are based on monthly indicators, except for that of economic activity and aggregate
demand, which uses quarterly indicators. Grey lines correspond to individual slack indicators used in the principal component
analysis.
Source: Estimated with data from INEGI and Banco de México.

3.   Recent Evolution of Inflation

3.1.   Inflation

In 2017, inflation was negatively influenced by a series of shocks of considerable magnitude, both external and domestic, pushing it to close the year at levels not observed since 2001. These shocks occurred in an environment in which, given the cyclical conditions of the economy, their assimilation could turn more difficult. This underscores the importance of the monetary policy to prevent these shocks from generating second-round effects and from affecting medium- and long-term inflation expectations. In particular, since the beginning of 2017 inflation was affected by the depreciation of the Mexican peso and its increased volatility. This resulted from the uncertainty over the stance of the new U.S. government in its bilateral relation with Mexico, as well as of higher energy prices, which derived from the liberalization process, which was the case of gasoline and LP gas. It should be noted that LP gas price increments not only were related to cost pressures, but also to the aspects of the market structure.[10] In addition, over the first half of the year, higher transport fares were registered across different cities of Mexico, along with higher prices of some agricultural products. The monetary policy stance has been adjusting to allow this change in relative prices, derived from these shocks, to take place in an orderly manner, without generating second-round effects on the price formation process of the economy. Thus, starting from September 2017 inflation started to reach a certain turning point to the downside, in part thanks to the monetary policy actions that have been adopted so far.

However, over the last few months of last year a series of additional shocks gave a new drive to inflation. Average annual headline inflation rose from 6.48 to 6.59 percent between the third and the fourth quarters of 2017, and marked 6.77 percent in December. Some of these shocks were: higher energy prices, particularly LP gas, and higher prices of certain fruits and vegetables, which were associated to weather factors; a further depreciation of the Mexican peso and an increase in its volatility, derived, among other factors, from the uncertainty associated with the NAFTA renegotiations, with the monetary policy normalization in the U.S., with the approval of the fiscal plan in the U.S., with a number of elements related to the electoral process in Mexico; and the short-term effect of the change in the calendar of the minimum wage increase, effective in December rather than in January. A great deal of the increase in headline inflation at the end of 2017 is explained by the dynamics of annual non-core inflation, which shifted from an average of 11.51 to 12.00 percent between the referred quarters, and marked 12.62 percent in December 2017. In contrast, annual core inflation presented a slight downward trend, marked on average 4.91 and 4.85 percent in the referred quarters, respectively, and 4.87 percent in December (Table 2). As presented in Section 2.2.4, different indicators on the current phase of the economic cycle of the Mexican economy, especially those related to the labor market and consumption, show that slack conditions in the economy have remained relatively tight. This could make the assimilation of shocks that have affected it difficult, which would influence the pace of the core inflation decline.

---

[10] See press release FECE-008-2018 of the Federal Economic Competition Commission (FECC): "FECC investigates possible absolute monopolistic practices in the LP gas market", issued on February 22, 2018.

Table 2
Consumer Price Index, Main Components and Trimmed Mean Indicators
Annual change in percent

| | 2016 | 2017 | | | | 2017 | 2018 | |
	IV	I	II	III	IV	December	January	1F February
CPI	**3.24**	**4.98**	**6.10**	**6.48**	**6.59**	**6.77**	**5.55**	**5.45**
Core	**3.28**	**4.19**	**4.78**	**4.91**	**4.85**	**4.87**	**4.56**	**4.32**
Merchandise	**3.98**	**5.33**	**6.22**	**6.37**	**6.11**	**6.17**	**5.78**	**5.29**
Food, beverages and tobacco	4.26	5.93	6.82	7.29	6.80	6.82	6.50	6.17
Non-food merchandise	3.75	4.83	5.73	5.60	5.53	5.62	5.17	4.56
Services	**2.68**	**3.23**	**3.55**	**3.68**	**3.77**	**3.76**	**3.52**	**3.49**
Housing	2.40	2.52	2.56	2.61	2.66	2.65	2.62	2.57
Education (tuitions)	4.26	4.37	4.39	4.56	4.74	4.74	4.69	4.80
Other services	2.50	3.62	4.34	4.53	4.63	4.63	4.09	4.04
Non-core	**3.14**	**7.38**	**10.31**	**11.51**	**12.00**	**12.62**	**8.44**	**8.77**
Agriculture	**4.98**	**-0.20**	**6.39**	**12.07**	**8.99**	**9.75**	**10.76**	**10.45**
Fruits and vegetables	8.32	-6.88	9.60	21.80	15.59	18.60	20.65	17.95
Livestock	3.09	4.02	4.54	6.50	5.06	4.50	5.14	6.33
Energy and government approved fares	**2.00**	**12.28**	**12.90**	**11.14**	**13.92**	**14.44**	**7.10**	**7.82**
Energy	1.75	16.85	15.72	13.68	17.03	17.69	7.00	8.14
Government approved fares	2.48	3.91	7.99	6.82	8.20	8.36	7.31	7.15
Trimmed mean indicator [1]								
CPI	3.20	4.19	4.60	4.61	4.69	4.71	4.39	4.29
Core	3.27	4.00	4.39	4.50	4.48	4.46	4.20	4.01

1/ Prepared by Banco de México with data from INEGI.
Source: Banco de México and INEGI.

Chart 36
Consumer Price Index
Annual change in percent
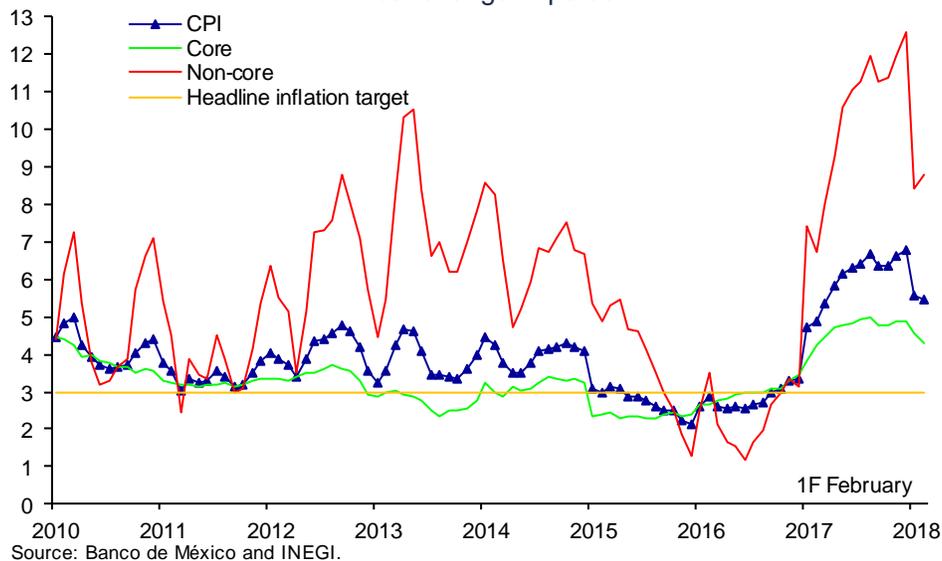
Source: Banco de México and INEGI.

Box 5
Fundamental Core Inflation

1. Estimation of Fundamental Core Inflation

This Box applies a methodology similar to that used by the European Central Bank (ECB) to calculate the price index that is even closer associated to the economic cycle than the core index. This is done by incorporating exclusively the prices of goods and services with the changes that have a positive and statistically significant relation to slack conditions in the economy.[1] The slackness indicator used for this analysis is the one presented in Box 3 of this Report and that consists of the first main component of 11 monthly slack series. Using this measure of slackness, a price indicator is built, which has a closer relation to changes in the economic activity than core inflation. This inflation measure corresponds to the one that is called in the ECB as "*supercore*" inflation and to which Banco de México refers as Fundamental Core Inflation.

Particularly, this Box analyzes the effect of changes in the slack conditions of economic activity on price adjustments of each item of the core component. This is done to construct an inflation measure that exclusively includes the items of core inflation that have a positive and statistically significant relation with slack conditions, and that, therefore, has a stronger relation to fluctuations in economic activity, and thus clearly signals a change in the inflation trend as a reflection of slack conditions in the economy. However, it should be pointed out that this indicator not only responds to changes in the cyclical conditions of the economy, but is also affected by other shocks on the inflation process, such as the exchange rate adjustments, adjustments in input prices and other supply shocks.

The main feature of this price index is that it is more sensitive to the phase of the economic cycle than core inflation, as it only includes goods and services that have a positive and statistically significant relation with adjustments in slackness levels of the economy. Therefore, its comparison with core inflation allows to evaluate more accurately the consequences of the said cycle on inflation.

To build Fundamental Core Inflation, the following regression is estimated for each item i of the core index for the period from January 2007 to November 2017:[2]

$$\pi_{i,t} = \alpha + \beta_{i,1}\pi_{i,t-1} + \beta_{i,2}E[\pi_{t+12}^{core}] + \beta_{i,3}TC_t + \beta_{i,4}Slack_t + \beta_{i,5}PComm_t + \epsilon_{i,t}$$

where:

$\pi_{i,t}$: is the annual change of the price index of item i in the period t,

$E[\pi_t^{core}]$: are 12-month core inflation expectations from Banco de México's Survey among Private Sector Specialists,

TC_t: is the annual change of the exchange rate in period t,

$PComm_t$: is the annual change of the commodities' price index in period t, and

$Slack_t$: is the first main component of 11 slack measures referred in period t.

The choice of items for Fundamental Core Inflation is based on the results of these regression. In particular, the index is built exclusively using goods and services, in which the coefficient $\beta_{i,4}$ is positive and statistically significant, with a confidence level of 95 percent. That is, it only includes the items with price changes that have a positive and statistically significant relation with slack conditions in the economy. It should be noted that these price changes are also affected by exchange rate fluctuations and input prices fluctuations.

2. Results

Considering the results of the regressions, it is obtained that the indicator of Fundamental Core Inflation includes 45 items of core inflation, with a weight of 38 percent within core inflation and 29 percent of headline inflation.[3] Items of Fundamental Core Inflation are listed in Table 1.

Chart 1 shows that shifts in Fundamental Core Inflation are related to fluctuations of the slackness indicator. In particular, the decline in Fundamental Core Inflation is associated with conditions of higher slackness and vice versa. Thus, in mid-2017 Fundamental Core Inflation attained the highest levels since June 2009, which reflects, in addition to supply factors, the absence of slack in the economy. Furthermore, changes in the slackness measurement appear to anticipate those in Fundamental Core Inflation, presenting a maximum correlation of 0.8 percent with a 10-month lag period.[4]

---

[1] European Central Bank. Monthly Bulletin, September 2014.
[2] This analysis period is chosen due to the availability of slack series of the economic activity described in Box 3.
[3] The respective weights in the ECB indicator are 45 and 32 percent, respectively.

[4] Granger causality tests were carried out between the indicator of Fundamental Core Inflation and the slackness indicator. The results indicate that the causality relation goes from the slack indicator towards Fundamental Core Inflation and not vice versa.

Chart 1
Fundamental Core Inflation and Main Component of 11 Slackness Series
Annual change in percent and figures in percent

1F February
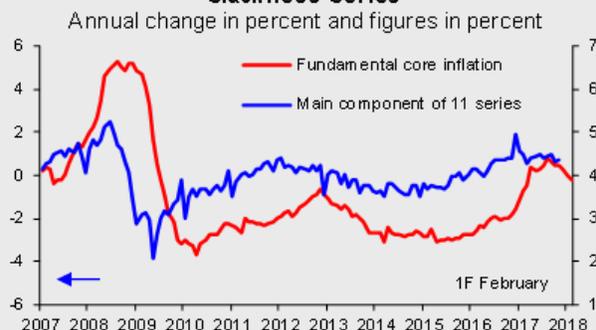
Source: Own estimates with data from Banco de México and INEGI.

It should be noted that the recent decline in Fundamental Core Inflation seems to be related to the fact that some components of the quarterly slackness indicator estimated in Box 3 appear to be reverting towards zero (Chart 2).

Chart 2
Fundamental Core Inflation and Main Quarterly Component of 12 Slackness Series
Annual change in percent and figures in percent

1F February
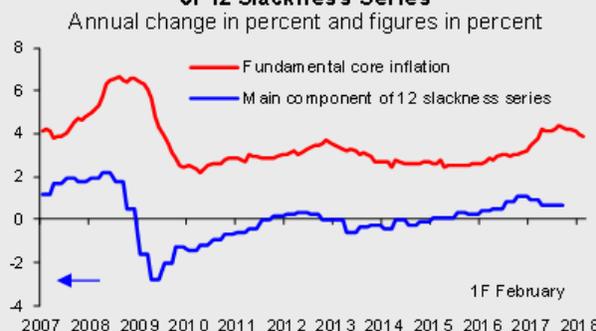
Source: Own estimates with data from Banco de México and INEGI.

This result seems to indicate, at the margin, that the tightening of the cyclical phase of the economy has started to cede, which could be congruent with the core inflation decline.

Table 1
Selected Items to Build Fundamental Core Inflation

Item	Weight in core inflation Data in percent
Sliced bread	0.25
Tarts and cakes in bulk	0.06
Soup noodle	0.16
Wheat flour tortillas	0.12
Wheat flour	0.04
Rice	0.19
Ham	0.25
Pasteurized and fresh milk	1.85
Powdered milk	0.14
Evaporated, condensed milk and mat.	0.08
Fresh cheese	0.29
Oaxaca cheese and string cheese	0.24
Manchego cheese or Chihuahua cheese	0.11
American cheese	0.03
Edible vegetable oils and fats	0.32
Canned beans	0.07
Canned vegetables	0.08
Other canned fruits	0.03
Bottled water	0.52
Mayonaise and mustard	0.08
Concentrated chicken and salt broth	0.06
Other seasonings	0.03
Potato chips	0.10
Other cooked foods	1.22
Roasted chicken	0.50
Other liquors	0.07
Housing rent	4.37
Own housing	18.27
Mattresses	0.21
Fans	0.07
Candles	0.06
Softeners and cleaning products	0.67
Dietary products	0.07
Medical care during childbirth	0.17
Haircuts	0.54
Toilet paper and disposable tissues	0.76
Lubricating oils	0.12
Batteries	0.04
University	2.30
Elementary school	1.20
Secondary school	0.86
Preschool	0.48
Tourism packages	0.70
Newspapers	0.16
Magazines	0.05
Total	37.96

Source: Own estimates with data from Banco de México and INEGI.

3. Final Remarks

This Box displayed a measurement of prices that closely responds to the main changes in slack conditions in the economic activity. In particular, to construct this price subindex, which was denominated Fundamental Core Inflation, only core inflation items with a positive and statistically significant relation with the economic activity were considered. The results suggest that changes in economic activity tend to precede price adjustments, in particular those of Fundamental Core Inflation. This indicator will continue to be used to complement Banco de México's inflation analysis on a regular basis.

References

European Central Bank. Monthly Bulletin, September 2014.

As expected, in January 2018, annual headline inflation dropped significantly, derived from the arithmetic effect associated with the fact that in 2018 energy price increments were not characterized by the same magnitude as those in early 2017. Similarly, it derived from a decline in core inflation, which reflects the fading of indirect effects of energy price increments on merchandise and services and a certain change of trend at the end of 2017. In January, annual headline inflation decreased to 5.55 percent, while annual core inflation attained 4.56 percent and non-core inflation, 8.44 percent. In the first fortnight of February, annual headline inflation reached 5.45 percent, while core and non-core inflation marked 4.32 and 8.77 percent, respectively. Although the inflation decline in early 2018 was important, it was limited because the price increments of some components of the non-core index, that had been observed since the end of the previous year, persisted. In particular, this subindex continued to be negatively affected in January, as high price increments of LP gas and gasoline prevailed. In addition to that, the price increases in some fruits and vegetables, which had been registered over the previous months, did not dissipate fully (Table 2 and Chart 36).

To illustrate in greater detail the evolution of headline and core inflation both at the margin and in terms of their trends, below some indicators providing additional information are analyzed.

In the first place, the proportion of the headline and core CPI baskets is analyzed, which presents monthly (seasonally adjusted and annualized) price changes that are grouped into certain intervals. The defined intervals are: i) items with a price change below 2 percent; ii) between 2 and 3 percent, iii) greater than 3 and up to 4 percent; and iv) over 4 percent. In the same vein, the percentage of these baskets is presented in two additional categories: the one with monthly price changes smaller or equal to 3 percent, and the one with monthly price changes over 3 percent (Chart 37). The percentage of the CPI basket and of the core index with price increases below 3 percent has tended to increase over the recent months (the blue and green areas, Chart 37). In particular, the share of the basket of the headline index with monthly annualized price changes below or equal to 3 percent (the area below the yellow line) was 41 percent in the third quarter of 2017, 45 percent in the fourth one, and marked 43 percent in the first fortnight of February 2018. For the core index, the respective shares were 43, 46 and 46 percent.

Chart 37
Percentage of CPI basket according to Intervals of Monthly Annualized Increment, s. a. [1]
Percent

a) CPI

b) Core
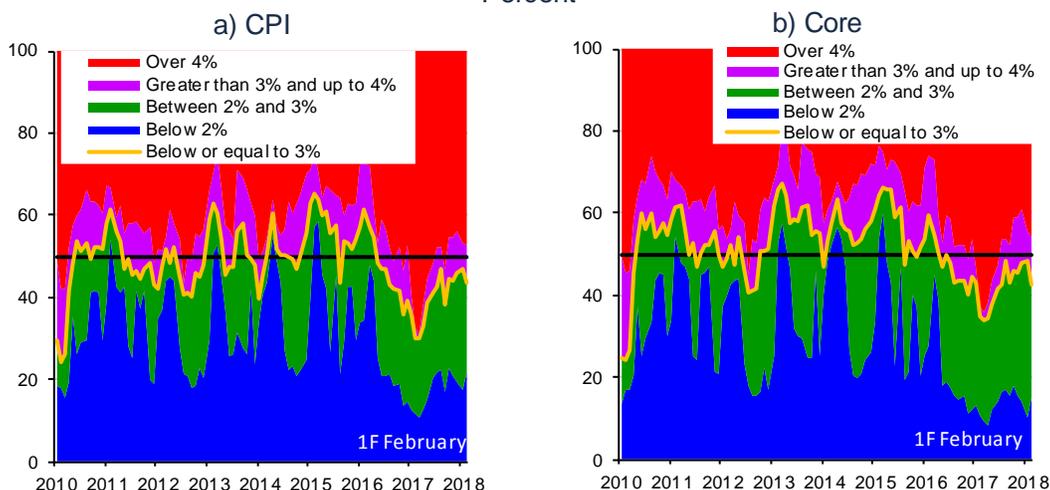
s. a. / Seasonally adjusted data.
1/ 3-month moving average.
Source: Banco de México and INEGI.

The evolution of monthly (seasonally adjusted and annualized) changes of both headline and core indices showed a downward trend in the analyzed period, with a slight rebound at the margin. In addition, the moving average of these indices' six observations exhibits a declining trend, albeit somewhat attenuated in the case of the core index. Nevertheless, in both cases it is gradually approaching the 3.0 percent target. It stands out that while the monthly (seasonally adjusted and annualized) changes of services increased at the margin, those of merchandise decreased. Similarly, the measure of the merchandise subindex trend shows a slight rebound, while that of services maintains a decreasing trajectory (Chart 38).

A measurement of the medium-term inflation trend, represented by the Trimmed Mean Indicator, shows that in part the current levels of headline inflation derive from the performance of especially high prices of certain goods and services. That is, if the extreme price changes are excluded, the resulting inflation level is lower than the observed one. Indeed, between the third and the fourth quarters of 2017, the Trimmed mean Indicator of headline inflation shifted from 4.61 to 4.69 percent, and subsided to 4.29 percent in the first fortnight of February 2018. These figures compare to the observed inflation, which registered levels of 6.48, 6.59 and 5.45 percent, respectively. As regards annual core inflation, the Trimmed Mean Indicator remained relatively stable between the third and the fourth quarter of 2017, and reached 4.50 and 4.48 percent, respectively, while in the first fortnight of February 2018 it declined to 4.01 percent. Although the difference between the observed figures is not so broad as compared to that registered in the case of headline inflation, trimmed core inflation has also been lower than that exhibited in the last few months (Chart 39 and Table 2).

Chart 38
Annualized Seasonally Adjusted Monthly Change and Trend
Percent

a) CPI

b) Core

c) Merchandise

d) Services
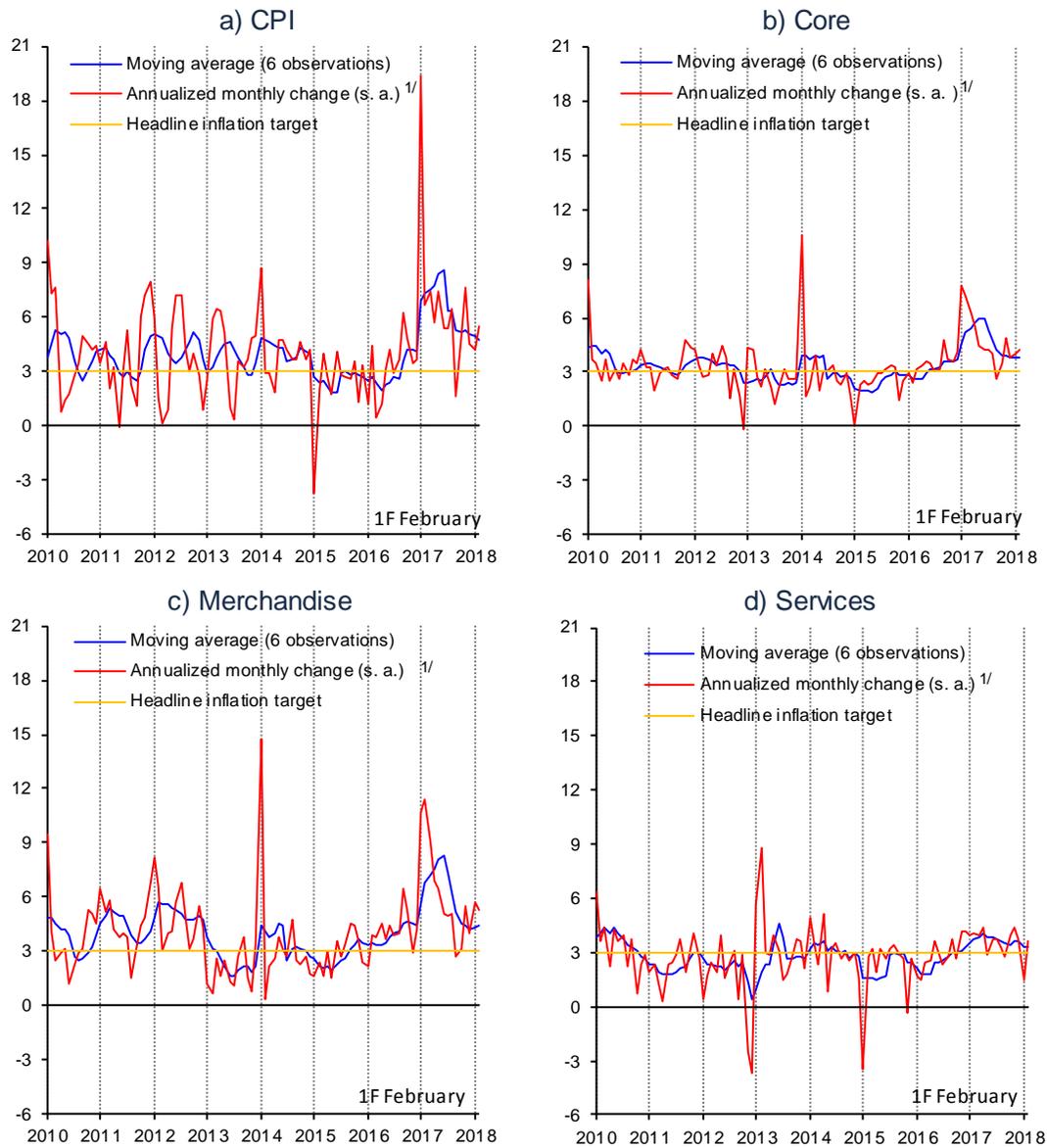
s. a. / Seasonally adjusted data.
1/ For the last observation, the annualized biweekly change is used.
Source: Seasonal adjustment prepared by Banco de México with own data and data from INEGI.

Chart 39
Price Indices and Trimmed Mean Indicators [1/]
Annual change in percent

a) CPI   b) Core
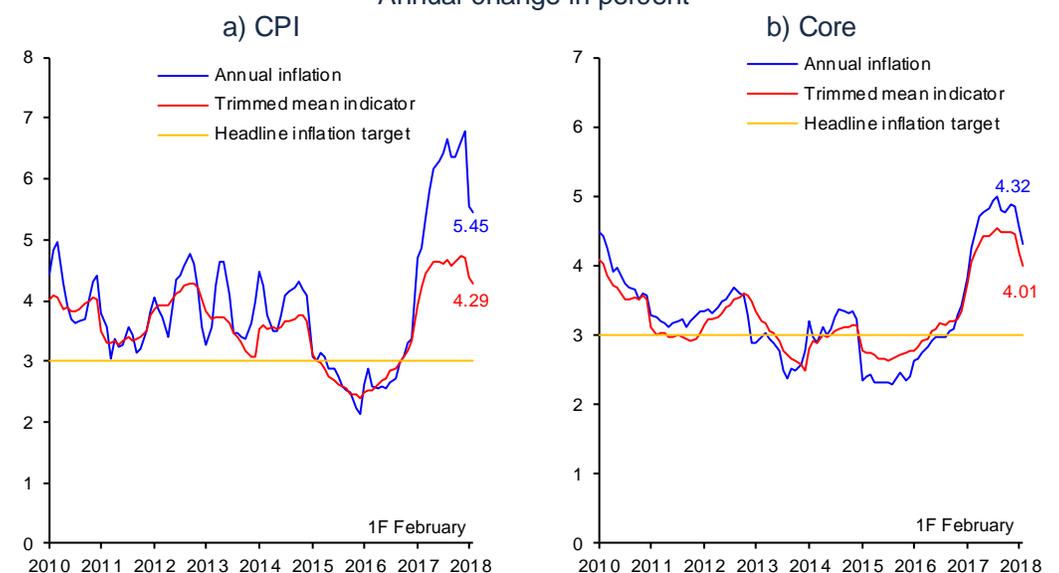
1/ The Trimmed Mean Indicator excludes the contribution of extreme variations in the prices of some generic items from the inflation of a price index. To eliminate the effect of these changes, the following is done: i) monthly seasonally adjusted changes of the generic items of the price index are arranged from the smallest to the largest value; ii) generic items with the biggest and the smallest variation are excluded, considering in each distribution tail up to 10 percent of the price index basket, respectively; and iii) using the remaining generic items, which by construction lie closer to the center of the distribution, the Trimmed Mean Indicator is calculated.
Source: Prepared by Banco de México with own data and data from INEGI.

3.1.1. Core Inflation

Fundamental Core Inflation allows to better identify pressures that affect inflation, especially those associated with the cyclical performance of the economy, although it also considers pressures related to other factors, such as the impact of the exchange rate and other shocks. This Index is built to better respond to adjustments in economic activity as compared to core inflation (see Box 5). In particular, fluctuations in the cyclical conditions of the economy tend to precede the changes in this indicator's trend. In mid-2017, this inflation measure reached its highest levels since June 2009 (Chart 40). Given that Fundamental Core Inflation better reflects the impact of the cyclical phase of the economy on price formation, the trend that has been exhibited since early 2017 suggests that, in addition to supply factors, and in particular the exchange rate adjustments, the lower slackness in some markets, specifically in the labor market, could have hindered the assimilation of shocks on inflation. However, of the last few months this inflation measure has exhibited a downward trend, which is congruent with the performance, at the margin, of slack indicators, whose tightening seems to be ceding moderately (see Section 2.2.4).

Chart 40
Core Inflation and Fundamental Core Inflation
Annual change in percent

Source: Own estimates with data from Banco de México and INEGI.
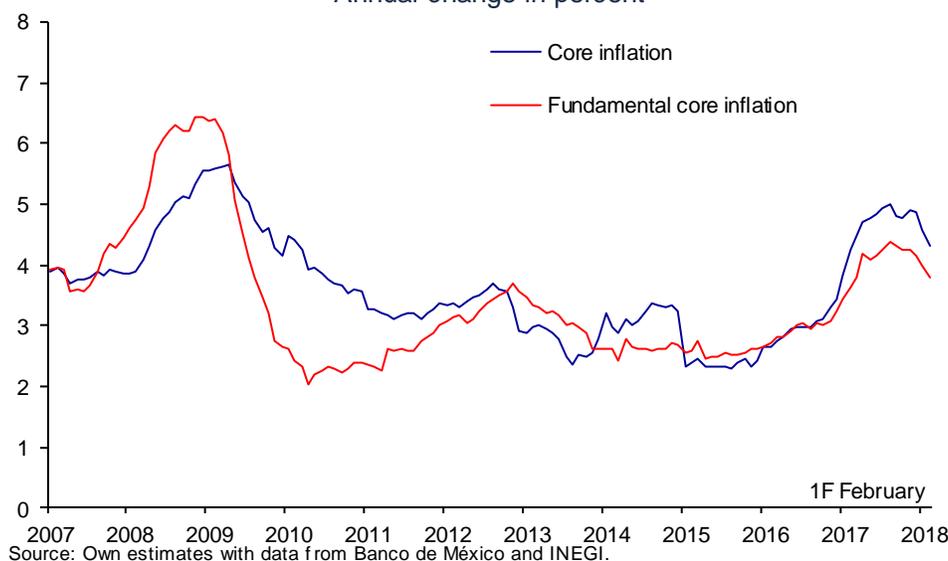
As mentioned above, core inflation has shown a slight decreasing trajectory, although the pace of its decline could be influenced by the cyclical position of the economy. However, although inflation has been subject to a number of shocks, such as higher energy prices, the depreciation of the exchange rate and higher prices of some agricultural products, no second-round effects on the price formation process seem to have been generated in the economy so far. In particular, the increase in the merchandise price index is attributed both to the adjustment in relative prices derived from the depreciation of the exchange rate (which is natural as they are internationally tradable goods) and to the indirect effects caused by higher energy prices and higher prices of agricultural products. Services' prices have also gone up, although at a lower rate as compared to merchandise prices. In particular, its evolution has been congruent with higher input costs, which suggests that no second-round effects have taken place. This is confirmed if the services that indeed respond to the exchange rate are excluded, such as air transportation, travel packages and intercity buses. In particular, it is established that the price dynamics of services for domestic consumption have been closely associated with those of their costs.[11]

In the performance of core inflation, and, in particular, of the accumulated gap between the change of merchandise prices and that of services prices, there is an important adjustment of relative prices, as a result of the depreciation of the real exchange rate in recent years and during the reported period. Specifically, the following should be mentioned:

i.   Between the third and the fourth quarters of 2017, the average annual change of merchandise prices shifted from 6.37 to 6.11 percent and marked 5.78 percent in January and 5.29 percent in the first fortnight of February. Both the subindex of food and non-food merchandise prices

---

[11] This derives from an update to the exercise presented in Box 1 of the Quarterly Report October – December 2016, "Indirect Effects of Energy Price Increments onto the Price formation Process of the Mexican Economy".

showed a decreasing trend in the analyzed period. Indeed, the average annual change of the first item declined from 7.29 to 6.80 percent between the mentioned quarters, and registered 6.50 percent in January 2018 and 6.17 percent in the first fortnight of February. Between the third and the fourth quarter of 2017, the average annual change of non-food merchandise declined from 5.60 to 5.53 percent. In January 2018 the annual change reached 5.17 percent and 4.56 percent in the first fortnight of February (Chart 41a and Chart 41b).

ii.   Despite an upward trend in the average annual change of the services' price subindex by the end of 2017, in January and in the first fortnight of February it declined again. In particular, its change shifted from 3.68 percent in the third quarter of 2017 to 3.77 percent in the fourth one, and declined to 3.52 percent in January and to 3.49 percent in the first fortnight of February. A large part of these prices' performance in the last quarter of 2017 is attributed to the arithmetic effect of the services different from education and housing, as reductions in mobile phone tariffs registered over the same period of the previous year did not take place again. Increments in some food services' prices also contributed to the above (Chart 41a). Lower growth rates of the services' price subindex in early 2018 also reflect the fading of the indirect effects of higher input prices, in particular of energy prices, on the services prices during the previous year.

Chart 41
**Core Price Index**
Annual change in percent

a) Merchandise and Services

b) Merchandise

Source: Banco de México and INEGI.
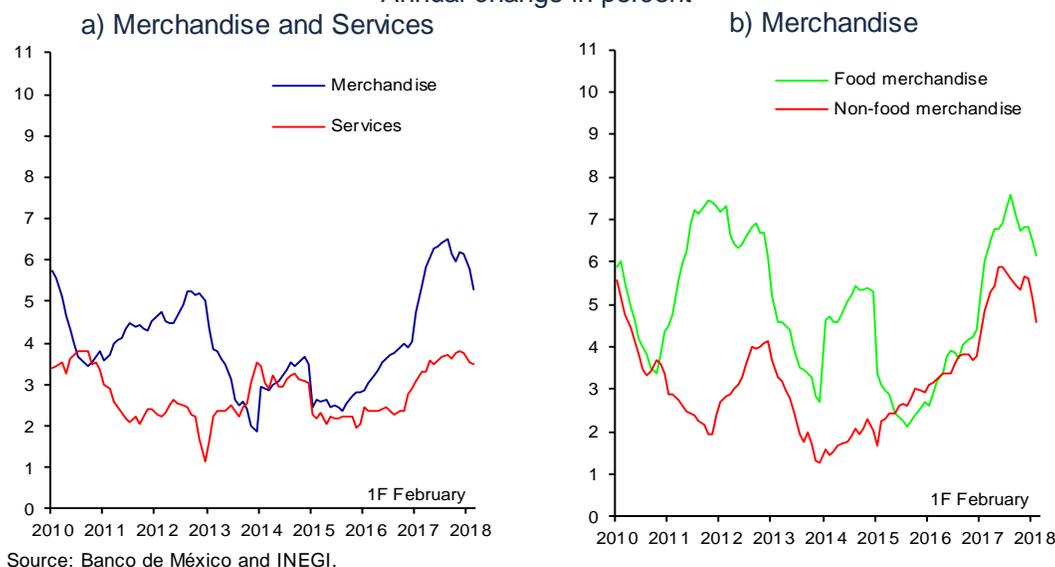
3.1.2.   Non-Core Inflation

As regards the performance of non-core inflation, the following is noteworthy:

i.   Between the third and the fourth quarters of 2017, the annual change rate of the agricultural products' price subindex decreased from 12.07 to 8.99 percent. Despite this, by the end of 2017 its increase in some fruits and vegetables prices with a high share of CPI started to be notable, such as

tomato, zucchini, green tomato and onion, among others. This was caused by adverse weather conditions in Mexico and in the U.S., where hurricanes across its different regions led to a lower supply of these goods. In particular, the tomato price shifted form an annual change of 13.26 percent in December 2017 to 43.56 percent in January 2018, and to 33.89 percent in the first fortnight of February. As a result, between November and December the annual change of the subindex of agricultural product prices went up from 8.84 to 9.75 percent and reached 10.76 percent in January and 10.45 percent in the first fortnight of February. Within it, the price of fruits and vegetables adjusted from 14.91 to 18.60 percent between November and December 2017, and marked 20.65 and 17.95 percent in January 2018 and in the first fortnight of February, respectively (Chart 42).

Chart 42
Price Index of Selected Fruits and Vegetables
Annual change in percent

Source: Banco de México and INEGI.
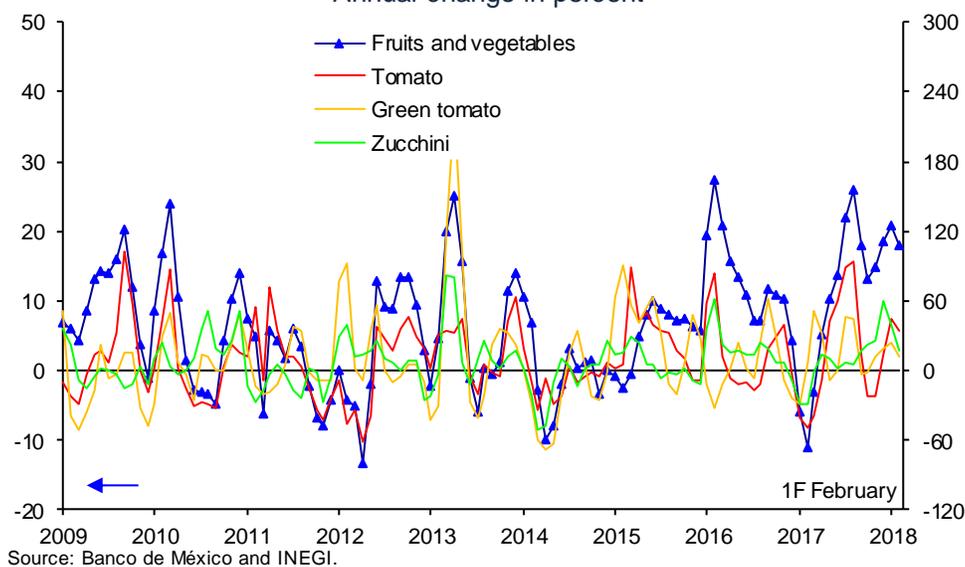
ii. The average annual growth rate of the energy price subindex and government approved fares increased from 11.14 percent in the third quarter of 2017 to 13.92 percent in the fourth one. In particular, the energy price subindex presented average annual changes of 13.68 and 17.03 percent in the same periods. The above was largely due to higher prices of LP gas since mid-third quarter, which were related to low international inventories and the hurricane Harvey impact on the U.S. supply. Thus, the average annual increase of this energy product shifted from 13.36 percent in the third quarter of 2017 to 39.93 percent in the fourth one. In January 2018, the annual change of the energy price index was considerably more moderated and marked 7.00 percent, while in the first fortnight of February it was 8.14 percent. Nonetheless, the annual change of the LP gas price remained high, reached 25.90 percent in January and 19.66 percent in the first fortnight of February. This contributed to limit the decrease in non-core inflation over these periods (Chart 43).

Chart 43
Price Indices of Selected Energy Products
Annual change in percent

Source: Banco de México and INEGI.
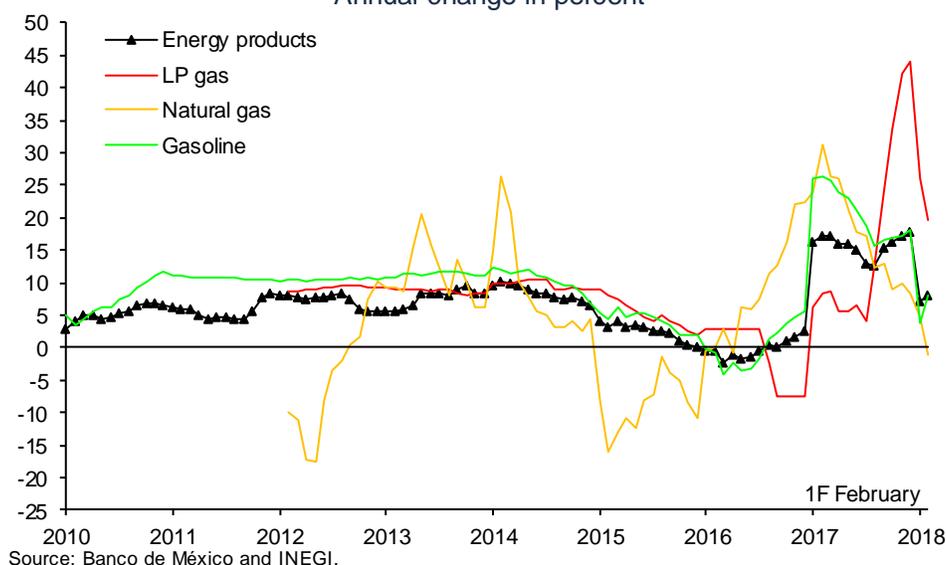
Delving in the above:

- In the fourth quarter of 2017, the average monthly change of gasoline was 0.77 percent, while in the third one it was 0.44 percent. This increase was associated with the additional depreciation of the Mexican peso in the last quarter of 2017, along with increases in this fuel's international references. In January 2018, these factors affected more noticeably the change of gasoline prices, which marked 3.11 percent in its monthly change, while in the first fortnight of February the change was 2.50 percent. It should be kept in mind that on November 30, 2017, the fourth and the last stage of the gasoline price liberalization program entered into force. Therefore, from that date onwards these prices are liberalized across all Mexican states.

- The natural gas price, determined in accordance with its international references, shifted from an average monthly increase of 0.85 percent in the third quarter to 0.02 percent in the fourth one, and registered a monthly change of 0.01 percent in January 2018 and no increase in the first fortnight of February.

- Low consumption electricity tariffs for domestic sector have remained unchanged since the 2 percent reduction at the beginning of 2016. High consumption electricity tariffs for domestic sector (DAC) varied, depending on the input costs required to generate electric power. In October, November and December 2017, DAC tariffs observed monthly changes of 0.6, 1.5 and 0.9 percent, respectively. The monthly changes of these tariffs in January and February 2018 were 2.9 and 1.5 percent.

- Between the third and the fourth quarters of 2017, the average annual change of government approved fares went up from 6.82 to

8.20 percent. It should be noted that in the wake of the earthquake on September 19, there was a free-of-charge period in subway services, as well as the city bus and parkings in Mexico City, along with some highways at the national level, which caused lower annual changes in the third quarter. In January 2018, the annual change of this item declined to 7.31 percent and further to 7.15 percent in the first fortnight of February.

In this context, because of the unforeseeable shocks on some energy prices, principally LP gas, as well as on some fruits and vegetables prices, the incidence of non-core inflation onto headline inflation was growing during the fourth quarter. The contributions of the agricultural products' item, energy products and government approved fares were greater. However, as stated above, since January 2018 the measured annual inflation no longer observes the impact of energy price increases registered over the same period of the previous year, which contributed to reduce the incidence of non-core inflation onto headline inflation (Chart 44).

Chart 44
**Consumer Price Index**
Annual impact in percentage points [1]
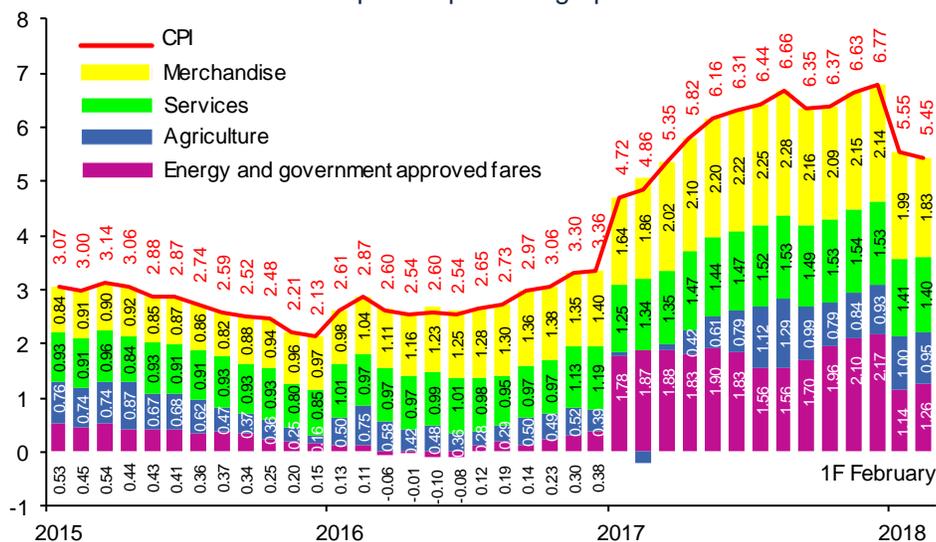
1/ In some cases, the sum of respective components can exhibit some discrepancies due to rounding.
Source: Prepared by Banco de México with data from INEGI.

3.2. Producer Price Index

Between the third and the fourth quarters of 2017, the Producer Price Index (PPI) of total production, excluding oil, registered a decrease in its average annual change rate from 5.35 to 5.05 percent, and later to 3.38 percent in January 2018 (Chart 45). The PPI component of intermediate goods has presented the largest contribution to the downside over the analyzed quarters, as its change decreased from 6.63 to 5.82 percent and marked 3.89 percent in January 2018. The annual change rate of finished goods' prices also decreased from 4.80 to 4.69 percent between the third and the fourth quarters and reached 3.16 percent in January 2018. Within it, the subindex of finished goods for domestic consumption kept declining (6.62 and 6.40 percent in the third and the fourth quarters of 2017, respectively, while in January 2018 it marked 5.44 percent). This PPI subindex has

the maximum predictive power on the performance of core prices of merchandise destined to consumers.[12]

Chart 45
Producer Price Index [1/]
Annual change in percent
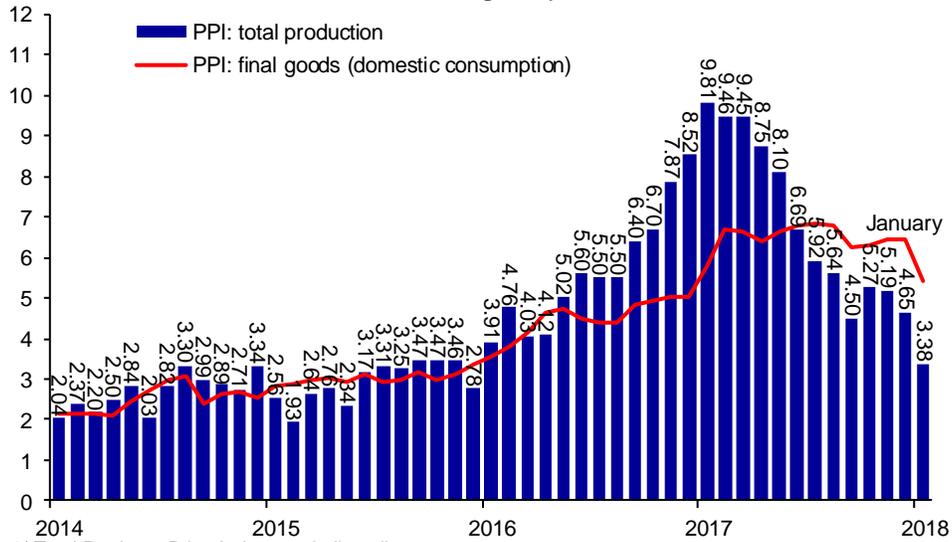
1/ Total Producer Price Index, excluding oil.
Source: Banco de México and INEGI.

---

[12] See Box 1 of the Quarterly Report April – June 2016, "Can Inflationary Pressures be Identified when Measured with CPI by means of the Performance of PPI Merchandise Subindices?".

4.   Monetary Policy and Inflation Determinants

To guide its monetary policy actions, the Board of Governors of Banco de México closely monitors the evolution of inflation relative to its expected trajectory, considering the adopted monetary stance and the horizon at which the monetary policy operates, as well as the available information on all inflation determinants and its medium- and long-term expectations, including the balance of risks to them. Going forward, the Board has stressed that it will continue to watch the potential pass-through of exchange rate adjustments onto prices, the monetary stance of Mexico relative to the U.S. and the evolution of slack conditions in the economy. Similarly, given the presence of risks, that, by nature, imply a high degree of uncertainty over their consequences for inflation and its expectations, the monetary policy is adjusted in a timely and firm manner. This contributes to the anchoring of medium- and long-term inflation expectations and to the convergence of inflation to its target (see Box 6).

During the first six months of 2017, the Board of Governors of Banco de México increased the benchmark rate by 125 basis points, raising it to 7 percent in June 2017, in order to face a complex environment of the economy and its consequences to inflation. Nevertheless, Banco de México maintained unchanged the target to the Overnight Interbank Interest Rate between July and November 2017. However, in view of the additional shocks that had affected inflation in late 2017, and in order to maintain a monetary stance that would prevent second-round effects on the price formation process and would reinforce the declining trend in annual headline inflation to its target, in the meetings of December 2017 and February 2018, the Board of Governors voted to raise the target rate by 25 basis points in each meeting, increasing it to a level of 7.50 percent. In the last monetary policy decision, the Board of Governors considered that slack conditions in the economy have been tightening, which could hinder the assimilation of shocks on inflation, and could affect the pace of the core inflation decline, and tighter monetary conditions that are expected in the U.S. economy (Chart 46a). It is worth noting that interest rates have increased to a real ex ante level close to 3.5 percent (Chart 46b). To put this level in perspective, the estimated range for the neutral short-term rate is 1.7 to 3.3 percent, with a medium point of 2.5 percent.[13]

---

[13] For a description of the estimation of the short-term neutral interest rate, see Box "Considerations on the Evolution of the Neutral Interest Rate in Mexico", in the Quarterly Report, July - September 2016.

Box 6
Inflation Targeting Regime and the Role of Forecasts

1. Introduction

In order to comply with its constitutional mandate to procure the stability of the purchasing power of the Mexican peso, in 2001 Banco de México adopted an inflation targeting regime as a framework to conduct its monetary policy, establishing an explicit annual inflation target of 3 percent of the Consumer Price Index (CPI) in 2003.[1] Taking into account the presence of a wide range of factors that are beyond the control of the monetary authority and that in the short run can affect the inflation evolution, Banco de México set a variability interval of plus/minus one percentage point around the referred target. As extensively documented, in addition to the institutional commitment to reach the explicit inflation target, this regime is characterized by the implementation of monetary policy in a framework of transparency and following the principle of clear communication with the public. Considering this, and given that monetary policy affects inflation via a number of transmission channels with lags, in practice the inflation targeting regime forecasts the future inflation trajectory in the horizon in which the monetary policy operates, and that is how it communicates it to the public. Evidently, this derives from the fact that monetary policy actions are adopted such that the monetary stance contributes to achieve the inflation forecast in the horizon in which these actions operate. This Box presents the main features characterizing the inflation targeting regime, emphasizing the role of forecasts, as well as the context in which the monetary policy in Mexico has been operating and will continue to operate under this regime.

2. Inflation Targeting Regime

Under the inflation targeting regime, a central bank's priority is to achieve a quantitative inflation target. To be able to implement measures consistent with the inflation convergence to its target, it is relevant for the central bank to assess, among other factors, the sources of inflation pressures during the decision-making process. In particular, in case of sustained demand-related inflation pressures, which cause inflation to divert from its target, it is considered appropriate for the central bank to take measures to curb these pressures. When supply shocks arise, reflecting an adjustment in relative prices, and generally causing transitory inflation deviations from its target, it is not recommended for the monetary authority to try to offset these pressures in the very short term, leading to reductions in other prices via increments in interest rates, given the costs of this strategy and considering that

the impact of these shocks on inflation tends to be transitory. However, if these shocks happen to be of such magnitude that they may contaminate medium- and long-term inflation expectations, the central bank should assess the pertinence of taking measures to prevent jeopardizing the attainment of the inflation target.

In addition to identifying the source of inflation pressures, a central bank comprehensively assesses the economic juncture, the prevailing monetary and financial conditions, and their outlook in the horizon at which the monetary policy operates. Furthermore, it makes decisions considering the inflation level and its evolution relative to its projections, in addition to inflation expectations, especially medium- and long-term ones. This allows to identify the need to adjust the monetary policy stance when, due to a number of factors, inflation deviates from its expected trajectory, depending on the inflationary shock and its risk to inflation. As mentioned above, considering that inflation can temporarily divert from its target in the presence of transitory shocks, and the lagged effect of monetary policy on inflation, the central bank commitment is that inflation evolves in line with its projection in the horizon in which the monetary policy operates. Thus, central bank's inflation forecasts are an explicit reference, easy to observe and to evaluate by the public, as it can facilitate the central bank's communication and improve the understanding of the monetary policy scope[2]. In this context, the reference rate is set to attain the inflation forecast in the period in which the monetary policy operates. Among other factors, its adjustments can respond to events that cause the observed inflation to divert from the forecast trajectory.

In the particular case of Mexico, Banco de México's Board of Governors evaluates the inflation forecasts, along with other macroeconomic variables and publishes them on a regularly basis. At every moment these forecasts consider a monetary policy congruent with the inflation target. In this context, it is assessed if inflation deviations from the forecast justify adjustments in the monetary policy. All available information is incorporated, including the performance of inflation expectations, the Central Bank's vision of the monetary policy transmission mechanism, as well as the horizon at which it operates, which in the case of Mexico is estimated to be between 4 and 6 quarters.[3] That is, in the monetary policy decisions, Banco de México's Board of Governors considers, among other factors, the evolution of inflation relative to its forecast trajectory, especially for the next 4 to 6 quarters.

---

[1] See the Monetary Program 2018 and Box 2 "Recent Changes in the Transmission Mechanism of Monetary Policy in Mexico" in the Quarterly Report January – March 2016.

[2] Svenson (1997), Clinton et. al. (2015).

[3] See Box 2 "Recent Changes in the Transmission Mechanism of Monetary Policy in Mexico" in the Quarterly Report January – March 2016.

Hence, the implementation of inflation targeting regime is characterized by a series of conditions and instruments:[4] i) the definition of an inflation target; ii) the estimation and the regular publication of inflation forecasts, conditional on the available information, which are key for monetary policy decisions; iii) the balance of risks associated to the inflation forecast; and, iv) an emphasis on the uncertainty around these forecasts, in many cases via fan charts.

3. Monetary Policy Conduct in Mexico in Recent Years

In literature, the relevance of having a transparent communication strategy has been emphasized, which would allow to communicate to the public all the elements considered in each monetary policy decision, including the inflation deviations from its target, the inflation forecast and the associated balance of risks.[5]

In this sense, in addition to the Central Bank's autonomy, the floating exchange rate regime and the absence of fiscal dominance, a key element for the effective inflation targeting regime in Mexico has been a policy of transparency, of constant communication and of accountability to the public. Insofar as a Central Bank has credibility and the economic agents have confidence that it will adjust the monetary stance when facing shocks that could divert inflation from its target in a sustained manner, inflation expectations tend to be better anchored to this target, making the process of convergence to the inflation target more efficient.

Recognizing the importance of all these elements to the monetary policy effectiveness, Banco de México has sought to improve its communication strategy with the public. Among these efforts, the following are noteworthy: the publication of the forecasts of macroeconomic variables, along with the elements in the balance of risks that could affect their trajectory in the future. In addition, to illustrate the probability of the occurrence of different scenarios with respect to the forecast variables, which reflects the uncertainty related to the forecast, starting from the Quarterly Report July – September 2011, the Board of Governors decided to release the forecasts of inflation and of other macroeconomic variables using fan charts. Subsequently, as of the Quarterly Report April – June 2017, it started to complement these charts with the central projection of the corresponding Report, along with that of the previous Report. The Board of Governors considered that this adjustment will contribute to strengthening the Central Bank's role in generating expectations, which in turn will further strengthen the channel of inflation expectations in the monetary policy transmission mechanism, as it will allow to give to the public a more detailed explanation of the forecasts, the associated risks and the possible updates.

In this context, starting from this Report average quarterly inflation forecasts will be published. In particular, the vector corresponding to the central inflation forecasts and those corresponding to the previous Report will be reported. These forecasts will cover 8 quarters, starting from the quarter analyzed in each Report.

References

Banco de México. (2016) Box 2 "Recent Changes in the Transmission Mechanism of Monetary Policy in Mexico" in the Quarterly Report January – March 2016.

Banco de México (2018). Monetary Program 2018.

Carare A. and Stone M. (2003) Inflation Targeting Regimes IMF working papers. WP/03/09.

Clinton, Kevin, Freedman, Charles, Juillard, Michel Kamenik, Ondra, Laxton, Douglas and Wang, Hou. (2007) "Inflation-Forecast Targeting: Applying the Principle of Transparency" IMF, Working Paper 15/132.

Svensson, Lars E. O. 1997. "Inflation Forecast Targeting: Implementing and Monitoring Inflation Targeting." European Economic Review, 41(6): 1111–46.

Woodford, Michael (2007). "The Case for Forecast Targeting as a Monetary Policy Strategy" Journal of Economic Perspectives. Volume 21, Number 4. Fall 2007.

---

[4] Clinton et al. (2015), Svensson (1997), Woodford (2007).
[5] Clinton et al. (2015).

Chart 46
Target for the Overnight Interbank Interest Rate, Headline Inflation and Real Ex Ante Rate
Annual percent

a) Target for the Overnight Interbank Interest
Rate and Headline Inflation [1/]

b) Real Ex Ante Short-term Rate and Estimated
Range for Real Neutral Short-term Rate in the
Long Term [1/]
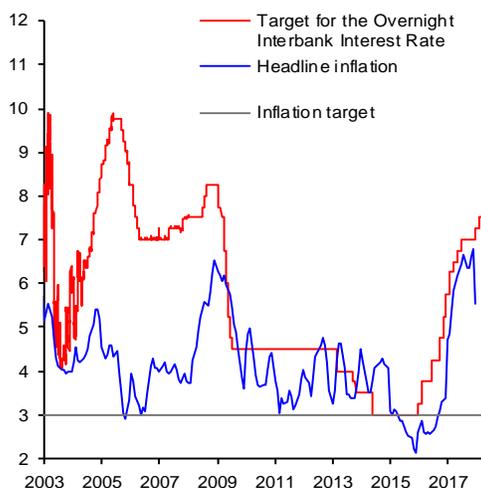
1/ The Overnight Interbank Interest Rate is shown until January
20, 2008. The latest inflation figure corresponds to January.
Source: Banco de México.
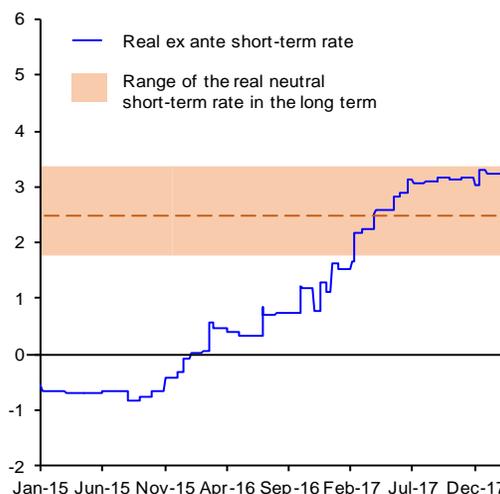
1/ Real ex ante short-term rate is calculated as the difference
between the target for the Overnight Interbank Interest rate
and the mean of inflation expectations for the next 12 months,
derived from Banco de México's Survey. The dotted line
corresponds to the mid-point of the range.
Source: Banco de México.

Considering the horizon at which the monetary policy operates, the following factors affected the actions taken during the analyzed period: i) the performance of inflation with respect to its estimated trajectory; ii) the behavior of the main inflation determinants; and iii) the evolution of medium- and long-term inflation expectations.

As regards the evolution of inflation with respect to its forecast, using the information available at the moment of the release of the Quarterly Report July – September 2017, annual headline inflation was anticipated to continue with a downward trend in 2017 and this trajectory was estimated to accentuate during 2018, reaching a level close to 3 percent by the year end. However, in view of additional unexpected shocks at the end of the year, inflation increased and closed 2017 at 6.77 percent. This inflation trajectory was higher than anticipated in the referred Report. Subsequently, despite a considerable decline in inflation at the beginning of 2018, the performance of non-core inflation kept perceiving the shocks that had affected it at the end of 2017, so this decrease was smaller than anticipated. Because of these shocks, there was a delay in the estimated trajectory of the annual headline inflation convergence to the 3.0 percent target. Indeed, although in the previous Report it was expected to attain the level by the end of 2018, as a result of the above, currently it is estimated to reach those levels in the first quarter of 2019 (see Chart 50 in Section 5). The expected trajectory of core inflation is expected to continue declining gradually, to reach levels close to 3.0 percent in the first quarter of 2019, and to consolidate at that level during the year. In this sense, the trajectory of core inflation had smaller adjustments with respect to the expected in the previous Report (see Chart 51 in Section 5). The delay in the inflation convergence to its target was one of the elements considered by the Board of Governors in their

decision of the February meeting. In fact, because of the adjustment in the reference rate carried out in that meeting, despite the shocks on inflation at the end of 2017 and in early 2018, inflation is expected to converge to its target in the horizon at which the monetary policy operates. At the same time, the new forecasts consider the impact of the implemented monetary policy actions, which affect inflation with a certain lag.

As regards inflation determinants, the one referring to the potential pass-through of exchange rate adjustments onto prices should be highlighted. It should be remembered that changes in the real exchange rate are a natural adjustment mechanism of the economy in light of different disturbances, and that they lead to changes in the relative prices of merchandise with respect to services. In this context, the role of the monetary authority is to ensure that such adjustments take place in an orderly manner, without generating second-round effects on inflation. In the period analyzed in this Report, the Mexican peso depreciated against the U.S. dollar and its volatility increased considerably, although starting in January 2018 a certain reversal in this trend was observed.

i.   Among the factors that pressured the exchange rate at the end of 2017 was the uncertainty related to: i) the U.S. monetary policy normalization process, the approval of the fiscal package in the U.S., and its final ratification in December 2017; ii) the renegotiation of NAFTA, and iii) a number of domestic events related to the electoral process in Mexico. Hence, the Mexican peso oscillated between MXN/USD 18.00 and MXN/USD 19.70 between the end of September and the end of December 2017. Nonetheless, since early January the Mexican peso has appreciated slightly, and marked MXN/USD 18.6 in late February (Chart 47a and Chart 47b). This was associated with the monetary policy actions implemented by Banco de México, a somewhat improved environment in NAFTA negotiations and the generalized weakness of the U.S. dollar. In this context, survey-based expectations for the exchange rate at the end of 2018 and 2019 have been strongly affected by its recent quote, as it adjusted from September to January from MXN/USD 18.21 to MXN/USD 19.04 for 2018, and from MXN/USD 18.01 to MXN/USD 18.61 for 2019.

ii. In the presence of factors that affected liquidity in the foreign exchange market and generated higher volatility, in October and December 2017 the Foreign Exchange Commission announced an increase in non-deliverable forward (NDFs) auctions settled in Mexican pesos for an amount of US$4 billion, on October 25, 2017, and of US$500 million on December 26, under the originally announced program.[14] This sought that the foreign exchange market continued to function in an orderly manner in the face of the mentioned factors. Similarly, it ratified its commitment to continue evaluating this market's operating conditions and did not rule out the possibility of taking additional actions, if required. It also stressed that the value of the Mexican peso will continue to be procured mainly by preserving sound economic fundamentals.

---

[14] See the Press Release of the Foreign Exchange Commission of October 25, 2017 and December 26, 2017.

Chart 47
Exchange Rate and Implied Volatility

a) Nominal Exchange Rate [1/]
MXN/USD
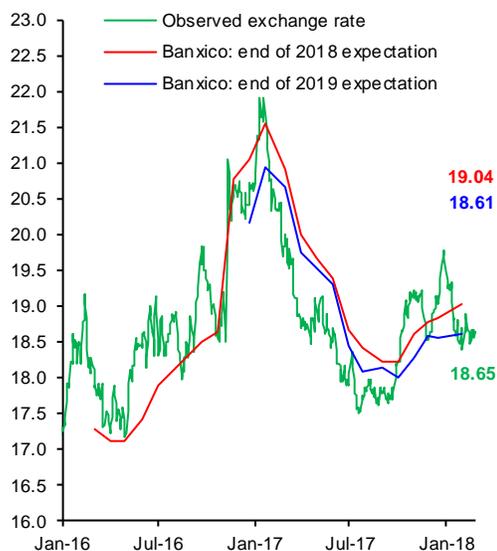
b) Implied Volatility in FIX Options
Percent
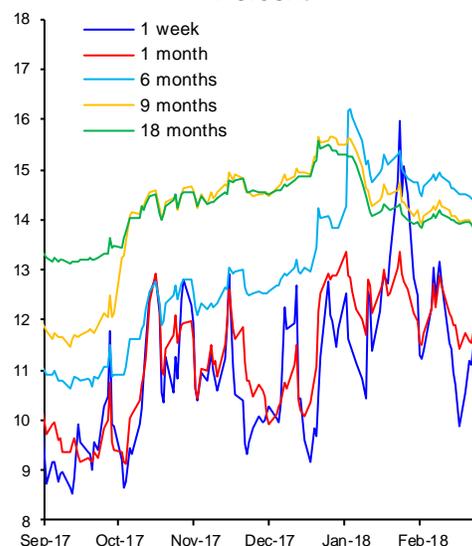
1/ The observed rate is the daily FIX exchange rate. Expectations correspond to the average of the January survey by Banco de México.
Source: Banco de México.

Source: Bloomberg.

Regarding the monetary policy stance of Mexico relative to the U.S., financial markets maintain an expectation of a gradual monetary policy normalization process by the U.S. Federal Reserve, including the program of reducing its balance sheet that started in October 2017. However, the consolidation of the cyclical recovery and the effect of the recently approved U.S. fiscal stimulus could affect inflation, which subsequently could accelerate the monetary policy normalization process, pressure interest rates upwards and propitiate a rebalancing of investment portfolios. As described in Section 2.1, international financial markets have started to acknowledge this risk.

Slack conditions in the economy have remained relatively tight, as mentioned in Section 2.2.4. This has been particularly evident in the labor market. It could hinder the assimilation of shocks on inflation, and, hence, could affect the pace of the core inflation decline. In this context, the monetary policy stance adopted by Banco de México turns especially relevant, to prevent second-round effects on the price formation in the economy.

With respect to inflation expectations, even though the mean of this expectation corresponding to the end of 2018 adjusted from 3.84 to 4.06 percent between September and January, this shift largely reflects the arithmetical effect of the shocks on non-core inflation over the last months (Chart 48a).[15] In contrast, the mean for core inflation was adjusted downwards from 3.72 to 3.63 percent over the

---

[15] The mean for headline inflation expectation for the end of 2018, based on the Citibanamex survey, went up from 3.82 to 4.11 percent between the surveys of September 20, 2017 and February 20, 2018.

same period, while the implicit expectation for the non-core component increased from 4.24 to 5.52 percent. The mean of the expectations for the end of 2019 was adjusted upwards from 3.55 to 3.65 percent.[16] The core component remained at 3.43 percent in the same period, while the implicit expectation for the non-core component has risen from 3.98 to 4.38 percent (Chart 48b). Ultimately, medium- and long-term expectations remained stable, although above the target, around 3.5 percent (Chart 48c).[17]

Chart 48
Inflation Expectations
Percent

a) Average Headline, Core and Non-core Inflation Expectations as of End of 2018
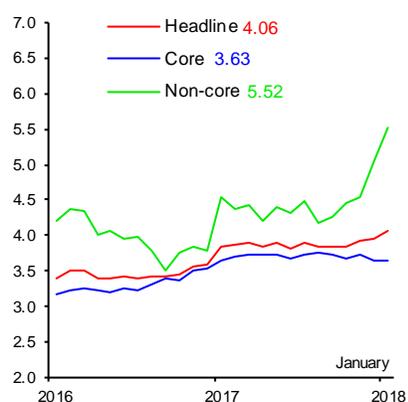
b) Average Headline, Core and Non-core Inflation Expectations as of End of 2019
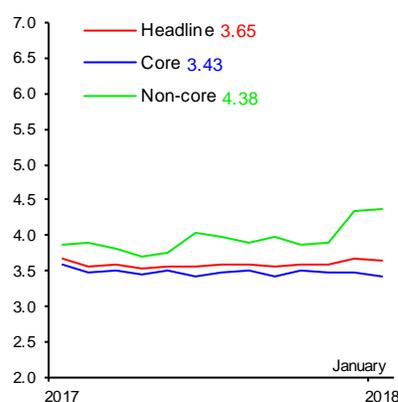
c) Average Headline Inflation Expectations for Different Terms

Source: Banco de México's survey.

Source: Banco de México's survey.
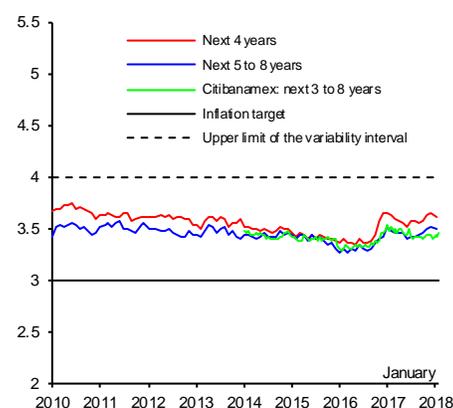
Source: Banco de México's survey and Citibanamex survey.

The break-even inflation (the difference between long-term nominal and real interest rates) rebounded between September and January, shifting from 3.53 to 3.87 percent (Chart 49a). Regarding its components, on the one hand, long-term inflation expectations implicit in market instruments (extracted from government instruments with 10-year maturities) increased slightly from 3.42 percent in September to 3.48 percent in January. These figures stand in contrast with the 3.2 percent attained in 2016. This rise mainly responds to the upward adjustment in shorter-term inflation expectations (1 to 5 years), the estimate of which lies at 3.80 percent, while the longer-term one (6 to 10 years) lies at 3.16 percent (Chart 49b). Meanwhile, the estimate of the 10-year inflation risk premium spiked from 9 to 39 basis points over the same span (Chart 49c).[18]

---

[16] The mean of headline inflation expectation for the end of 2019, based on the Citibanamex survey of February 20, 2018 marked 3.64 percent.

[17] Regarding the mean of long-term inflation expectations, based on the Citibanamex survey (for the next 3-8 years), it maintained around 3.5 percent between the surveys of September 20, 2017 and February 20, 2018.

[18] For a description of the estimation of long-term inflation expectations, see Box "Decomposition of the Break-even Inflation" in the Quarterly Report October – December 2013. For this Report, the estimation was updated to include data until November 2017.

Chart 49
Inflation Expectations
Percent

a) Break-even Inflation and Inflation Risk Implicit in Bonds
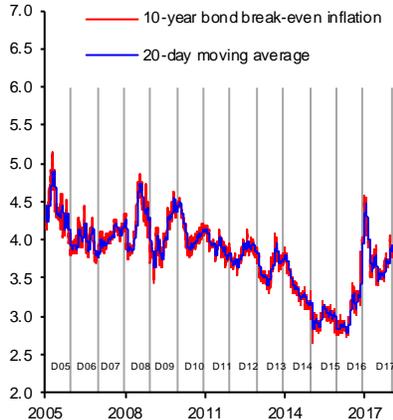
Source: Estimated by Banco de México with data from Valmer and Bloomberg.

b) Annual Inflation Expectations Implicit in Market Instruments [1]
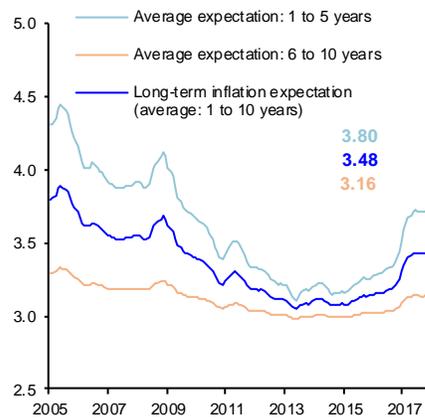
1/ The inflation expectation is calculated based on a similar model using data from Bloomberg, PIP and Valmer, based on Aguilar, Elizondo and Roldán (2016).
Source: Estimated by Banco de México with data from Bloomberg, Valmer and PIP.

c) 10-Year Inflation Risk Premium [1]
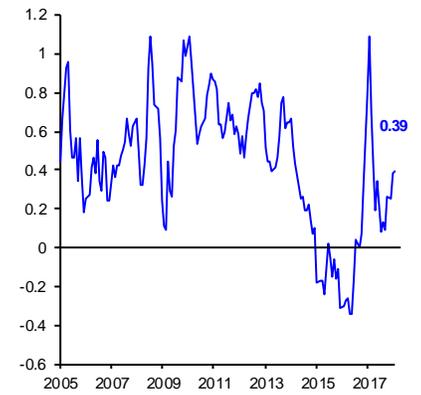
1/ The inflation risk premium is calculated based on a similar model using data from Bloomberg, PIP and Valmer, based on Aguilar, Elizondo and Roldán (2016).
Source: Estimated by Banco de México with data from Bloomberg, Valmer and PIP.

Interest rates in Mexico displayed high volatility and increases for all terms in the reference period, especially for 2 years and over. This was observed, above all, by the end of 2017, although the said increases have moderated slightly since the beginning of this year. The adjustments in the yield curve were affected by the reference rate increases in short-term interest rates, and pressures on external interest rates in longer-term ones. In the period analyzed in this Report, the 3-month interest rate increased 50 basis points from 7.1 to 7.6 percent, while the 2-year interest rate and the 10-year interest rate went up 90 basis points from 6.7 to 7.6 percent and from 6.8 to 7.7 percent, respectively (Chart 50a and Chart 50b). This pushed the yield curve upwards, which took place in an orderly manner, in part as a result of monetary policy actions implemented by Banco de México (Chart 50c).

Chart 50
Interest Rates in Mexico

a) Government Bonds Interest Rates
Percent
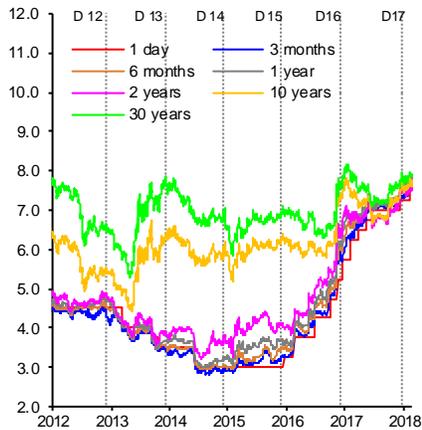
b) Yield Curve
Percent
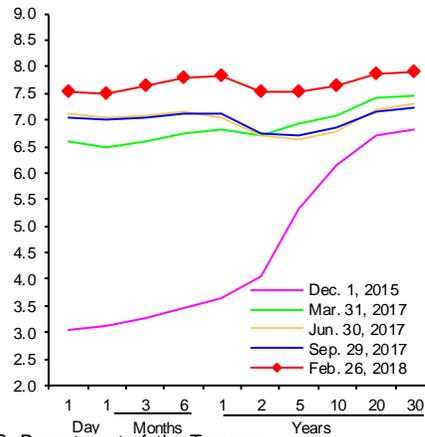

c) Slope of the Yield Curve
Basis points
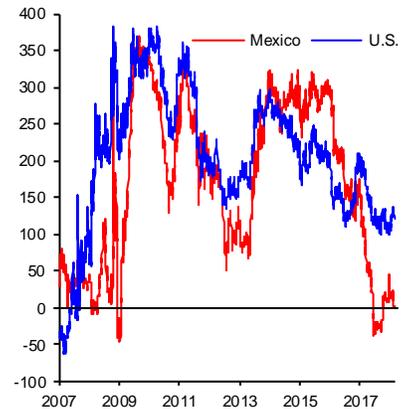
Source: *Proveedor Integral de Precios* (PiP) and U.S. Department of the Treasury.

During the fourth quarter of 2017 and in early 2018, spreads between Mexican and U.S. interest rates (especially short-term ones) remained high. From January to date, higher long-term interest rates in the U.S. have lowered the spreads of equivalent yield terms, although they still remain above those observed in the Quarterly Report July – September 2017. Thus, the spreads of 3-month and 2-year rates remained unchanged at about 600 and 530 basis points, respectively, as compared to the previous Report, while 10-year spreads increased by 20 basis points and amounted to 480 basis points (Chart 51a and Chart 51b).

Chart 51
Spreads between Mexican and U.S. Interest Rates

a) Spreads between Mexican and U.S. Interest Rates [1]
Percent
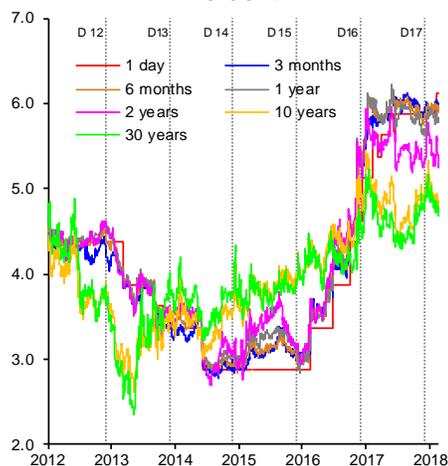
b) Curve of Spreads between Mexican and U.S. Interest Rates
Percentage points
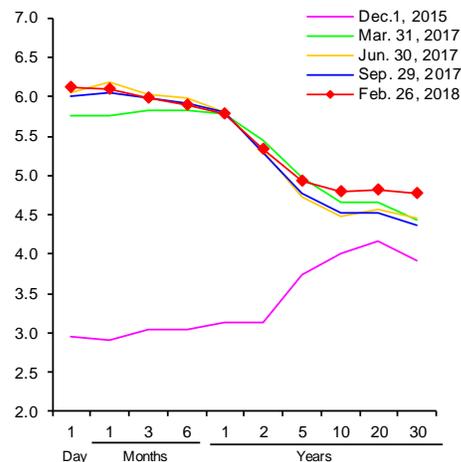
1/ For the U.S. target rate, the average of the interval considered by the Federal Reserve is considered.
Source: *Proveedor Integral de Precios* (PiP) and U.S. Department of the Treasury.

Market indicators that measure domestic sovereign credit risk decreased. Notably, these indicators for other emerging markets decreased to a greater degree (Chart 52).

Chart 52
Market Indicators that Measure the Domestic Sovereign Credit Risk [1]
Basis points

1/ It refers to 5-year Credit Default Swaps.
Source: Bloomberg.
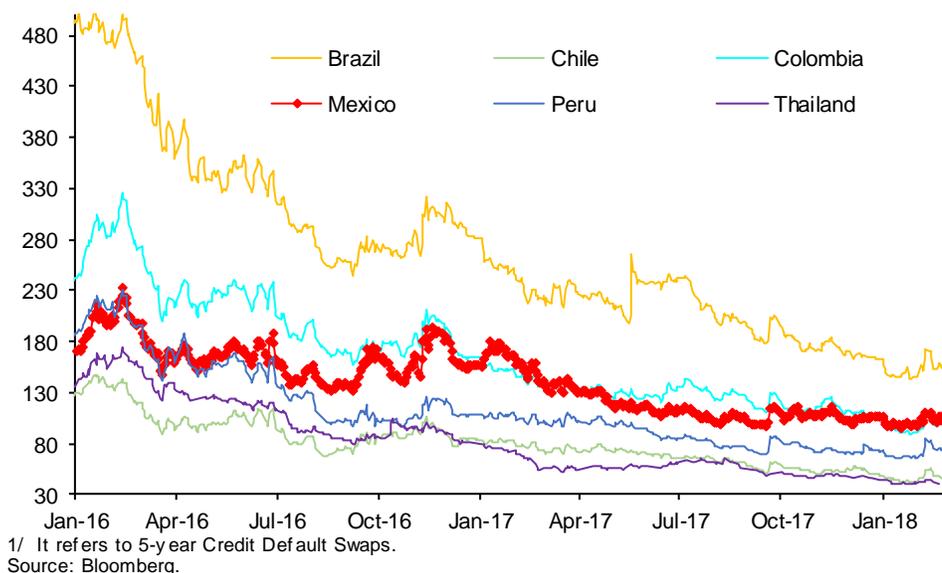
5. Forecasts and Balance of Risks

5.1. Forecasts for Economic Activity

GDP growth: The forecasts for economic growth in Mexico for 2018 and 2019 remain unchanged with respect to those published in the previous Report. GDP is still estimated to grow between 2.0 and 3.0 percent in 2018. In 2019, the economy is projected to expand between 2.2 and 3.2 percent (Chart 53a). These forecasts consider that, although the foreign demand faced by Mexico could benefit from higher growth expectations for the U.S. industrial production and for global trade, the prevailing uncertainty around the terms that will regulate Mexico's trade relationship in North America could continue to negatively affect the evolution of investment in the country.[19] Notably, slack conditions in the economy have been tightening, especially in the labor market, though recently they seem to have started to cede moderately. In this context, and considering that economic growth is expected to be close to its potential, the cyclical conditions are estimated to remain at levels similar to the current ones (Chart 53b).

Employment: In line with the recent evolution of the economy and the growth forecasts, in 2018 and 2019 the forecasts for the number of IMSS-affiliated jobs remain unchanged relative to the previous Report. Thus, for 2018 an increase of between 680,000 and 780,000 jobs is expected, while for 2019 growth of 690,000 and 790,000 jobs is projected.

Current Account: For 2018, deficits in the trade balance and the current account are anticipated to amount to 1.1 and 2.1 percent of GDP, respectively (US$13.7 billion and US$25.9 billion, in the same order). These forecasts compare to the projections in the previous Report of 1.0 and 2.1 percent of GDP, respectively (US$13.1 billion and US$25.9 billion, in the same order). For 2019, deficits in the trade balance and the current account are estimated to be 1.2 and 2.3 percent of GDP, respectively (US$15.0 billion and US$30.5 billion, in the same order), which compare to 1.1 and 2.3 percent released in the previous Report (US$14.5 billion and US$30.6 billion, respectively).

---

[19] The expectations for the U.S. industrial production in 2018 and 2019 were adjusted from 2.3 and 2.1 percent in the previous Report to 3.3 and 2.4 percent, respectively, in the current one, based on the consensus among business analysts surveyed by Blue Chip in February 2018.

Chart 53
Fan Charts: GDP Growth and Output Gap

a) GDP Growth, s. a.
Annual percent
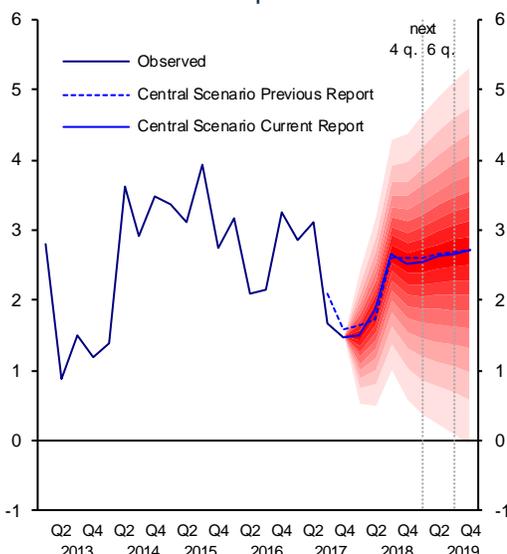
b) Output Gap Estimate, s. a.
Percentage of potential output
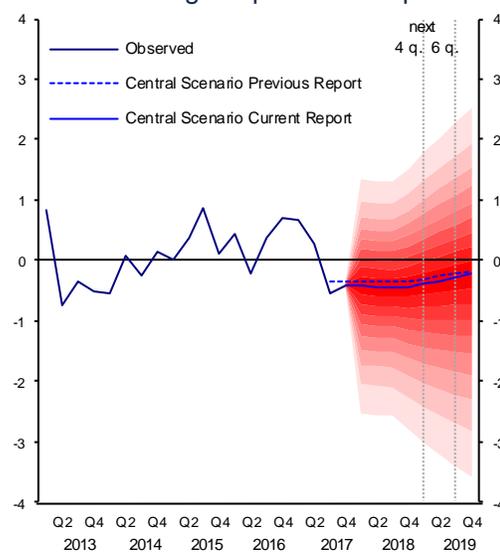
s. a. /Seasonally adjusted data. The next four and six quarters are indicated, using as a reference the first quarter of 2018; that is, the first and the third quarters of 2019, time intervals over which monetary policy transmission channels fully operate.
Source: INEGI and Banco de México.

s. a. /Seasonally adjusted data. The next four and six quarters are indicated, using as a reference the first quarter of 2018; that is, the first and the third quarters of 2019, time intervals over which monetary policy transmission channels fully operate.
Source: Banco de México.

The main downward risks to economic activity are:

i. Delays in the NAFTA renegotiation or that it result in an unfavorable outcome for the Mexican productive sector. In particular, an agreement that would lead to a new pattern of trade relations that affects the formation of global value chains could hurt not only growth in the short term, but also the long-term growth potential of the economy.

ii. Bouts of volatility in international financial markets, derived from the process of normalization of U.S. monetary policy or from other factors could lead to lower sources of financing.

iii. Volatility increases in domestic financial markets, associated with the electoral process in Mexico.

iv. Competitiveness of the Mexican economy is affected by several factors (external or domestic), such as corporate tax cuts in the U.S. and public safety issues in Mexico.

The main upward risks to growth are:

i. Uncertainty over NAFTA renegotiations is resolved, reinvigorating investment, possibly even across the sectors that heretofore have been excluded from the Agreement.

ii. The implementation of structural reforms yields greater-than-expected results. In this regard, certain progress has been observed, including positive results in rounds of bidding for exploration and extraction of

hydrocarbons, which are expected to lead to greater investment over the coming years and higher production in the medium term.

Despite the moderation in some of the most adverse risks to growth and the resumption of the economic growth in the last quarter of 2017, the balance of risks to growth is still biased to the downside. The downward trajectory of investment that has been observed for several years now, combined with the weakness it may maintain in the future, points to downward risks to economic growth in the medium and long term.

5.2.   Inflation Outlook

Inflation: Given the recent performance of inflation, the expected evolution of its determinants, the current monetary policy stance and the horizon at which it operates, headline inflation is forecast to continue to subside, approaching the 3.0 percent target over the course of the year, attaining it by the first quarter of 2019, and staying close to its target in the remainder of 2019. The delay in this trajectory is, in part, associated with the arithmetic effects of price increases in some energy products and fruits and vegetables, which affected non-core inflation in the last few months, along with the cyclical position of the economy, which could be influencing the pace of the core inflation decline. The estimated trajectory of core inflation is expected to continue to subside gradually, attain levels close to 3.0 percent in the first quarter of 2019 and consolidate convergence to that level during the remainder of the year (Table 3). These projections are based on the assumptions of an orderly exchange-rate performance, the absence of labor market-related pressures, and a sharp decline in non-core inflation during 2018, as long as the type of shocks that affected it last year do not take place again (Chart 54 y Chart 55).

Table 3
Headline and Core Inflation Forecasts
Average annual quarterly rate in percent [1]

	2018				2019			
	I	II	III	IV	I	II	III	IV
CPI								
Current report	5.5	4.8	4.3	3.8	3.2	3.0	3.1	3.2
Previous report	4.6	4.1	3.6	3.0	3.1	3.3	3.1	3.0
Core								
Current report	4.4	4.0	3.8	3.6	3.3	3.2	3.1	3.0
Previous report	4.2	3.9	3.6	3.5	3.3	3.2	3.1	3.1

1 Annual inflation for each quarter is estimated by comparing the average index of the quarter to the average index of the same quarter of the previous year. These figures can differ from the simple average of annual inflations of each month in the corresponding quarter.
Source: Prepared by Banco de México.

These forecasts are subject to risks. The main upward risks are:

i.   Currency depreciation in response to, for example, unfavorable outcomes during NAFTA negotiations, negative market reaction to U.S. monetary policy actions, tighter conditions in international financial markets, or volatility related to the 2018 electoral process.

ii. New unfavorable shocks on agricultural product prices.

iii. Spikes in some energy product prices due to increases in international reference prices or to lack of competition in some markets.

iv. Given the absence of slack in the economy, especially in the labor market, the evolution of unit labor costs could put pressure on inflation.

Among downward risks are:

i. Currency appreciation due to a favorable outcome in NAFTA negotiations.

ii. Lower-than-anticipated economic growth.

The balance of risks for inflation maintains an upward bias, associated with the risk scenarios described above, in an environment of high uncertainty.

Chart 54
Fan Chart: Annual Headline Inflation [1]
Percent
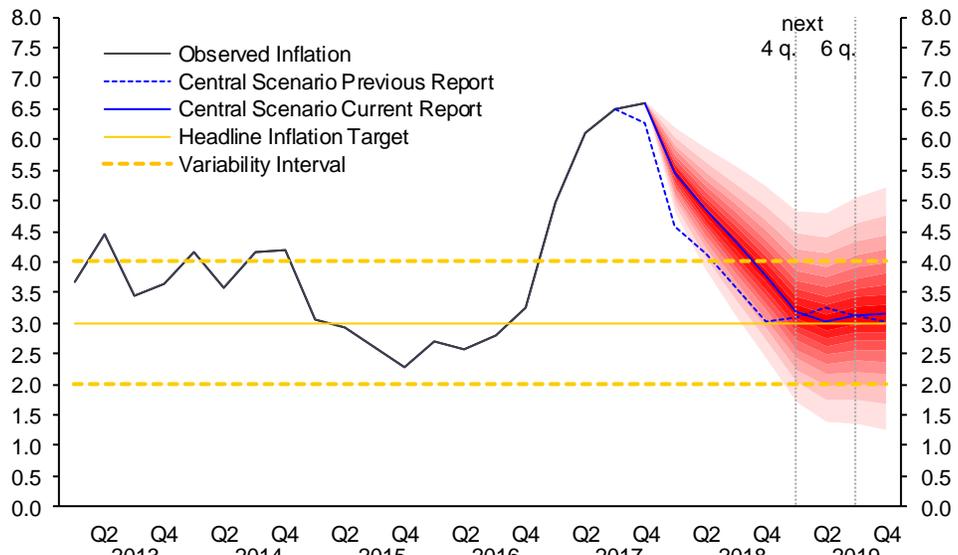
1/ Quarterly average of annual headline inflation. The next four and six quarters are indicated, using as a reference the first quarter of 2018; that is, the first and the third quarters of 2019, time intervals over which monetary policy transmission channels fully operate.
Source: Banco de México and INEGI.

Chart 55
Fan Chart: Annual Core Inflation [1/]
Percent
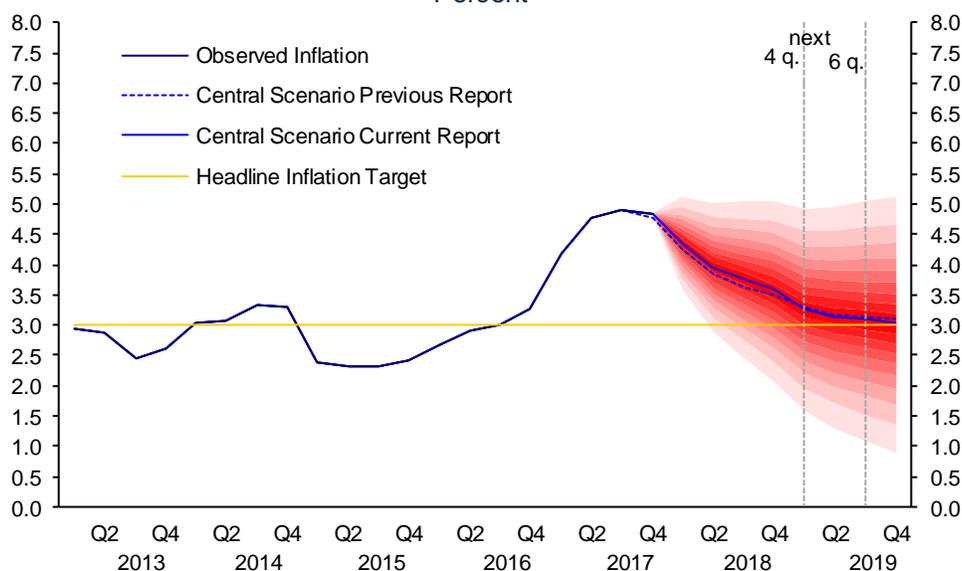
1/ Quarterly average of annual core inflation. The next four and six quarters are indicated, using as a reference the first quarter of 2018; that is, the first and the third quarters of 2019, time intervals over which monetary policy transmission channels fully operate.
Source: Banco de México and INEGI.

In this environment, the Board of Governors will keep monitoring inflation closely with respect to its expected path, taking into consideration the horizon at which the monetary policy operates, as well as the available information on all determinants of inflation, its expectations over the medium and long term, including the potential pass-through of exchange rate fluctuations onto prices, the monetary policy stance of Mexico relative to the U.S. and the evolution of slack conditions in the economy. In the face of risks to inflation and inflation expectations, if required, monetary policy will act in a timely and robust manner to reinforce the anchoring of medium- and long-term inflation expectations and to achieve convergence to the 3 percent target.

Thanks to the monetary policy actions implemented to keep medium- and long-term inflation expectations anchored, combined with the attainment of the fiscal goals in 2017 and the commitment to reach them in 2018, as well as the persistent resilience of the financial system, the Mexican economy is in a better position to face possible adverse scenarios. The early renewal of Mexico's Flexible Credit Line with the International Monetary Fund for the next two years should also be highlighted as recognition of Mexico's solid macroeconomic framework. In the future, in addition to pursuing a prudent and firm monetary policy, it is crucial to implement measures oriented to increase productivity, and that the authorities move forward in the consolidation of sustainable public finances.

In this context, so far, the strengthening of the macroeconomic framework in Mexico has contributed to the continued growth of the Mexican economy, despite a number of severe and simultaneous shocks it has faced. Nonetheless, the Mexican economy continues to face risks in the short and medium terms. To take on the challenges that may arise, it is key for Mexico to adopt the required measures to attain a more efficient allocation of resources and boost its productive capacity. Likewise, actions that help achieve higher productivity and enhance

competitiveness should be sought. Efforts should also be made to revert the downward investment trend and to increase infrastructure development. Additionally, as stated in previous reports, it is important to undertake reforms and broad actions that improve public safety, legal certainty and economic competition, all of which would result in a better environment for investment and economic growth, in lower inflation and a higher welfare for the Mexican population.

BANCO DE MÉXICO

February 2018

www.banxico.org.mx