BANCO DE MÉXICO

# Quarterly Report

## October – December 2016

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# QUARTERLY REPORT

This report analyzes recent developments in economic activity, inflation and different economic indicators of Mexico, as well as the monetary policy implementation in the quarter October – December 2016, 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.

## *FOREWARNING*

*This text is provided for readers' convenience only. Discrepancies may possibly arise between the original document and its translation to English. The original and unabridged Quarterly Report in Spanish is the only official document.*

*Unless otherwise stated, this document has been prepared using data available as of February 27, 2017. Figures are preliminary and subject to changes.*

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# 1. Introduction

During 2016 as a whole, the Mexican economy faced a challenging external environment, which deteriorated throughout the year. In particular, high volatility prevailed as a result, among other factors, of the uncertainty related to the process of the monetary policy normalization in the U.S., as well as to the elections held at the end of the year in that country and their outcome. This has led to an adjustment in international financial markets' portfolios, which strongly affected the national markets and as a result of which asset prices dropped and high volatility was observed. The effect of this environment on domestic financial markets was especially noticeable in the last quarter of 2016 and over the first weeks of January 2017, given the relevance that the outcome of the referred elections could represent for Mexico in light of the different elements of the possible economic policy implemented by the new U.S. administration. Thus, at the end of the year the national currency depreciated considerably and interest rates in Mexican pesos increased for all terms, while at the end of January and in February the exchange rate and interest rates registered a considerable reversal. As regards the exchange rate, this reversal was contributed to by the monetary policy actions undertaken by the Central Bank and the measures recently announced by the Foreign Exchange Commission. The impact of this environment on the performance of the exchange rate prompted a rise in core inflation, mainly in its merchandise subindex, as a reflection of the gradual change in relative prices induced by the depreciation. As a result of this performance, and of the increments in non-core inflation at the end of the year, as of October 2016 headline inflation slightly exceeded the 3 percent target, after persisting below this level for 17 consecutive months, and closed the year at 3.36 percent. Additionally, in January 2017 the upward trend in headline inflation was exacerbated by the impact of the adjustments in some energy prices, mainly gasoline, attaining an annual rate of 4.72 percent in that month and 4.71 percent in the first fortnight of February.

This environment could jeopardize the anchoring of inflation expectations and negatively affect its performance. Thus, in order to prevent contamination to the price formation process in the economy, to anchor inflation expectations and to strengthen the inflation convergence to its target, the Board of Governors decided to increase the target for the Overnight Interbank Interest Rate by 50 basis points in each of its decisions in November and December 2016, and in February 2017, to reach a level of 6.25 percent. These actions were taken while procuring that the adjustment in relative prices, which derived from the real exchange rate depreciation, and, in the case of the latter decision, also from other supply shocks, was orderly. It should be noted that the main challenge for the Board of Governors in the future is to prevent second round effects on inflation and to maintain medium- and long-term inflation expectations anchored.

Delving in the external environment faced by the Mexican economy, during the fourth quarter of 2016 the world economic activity continued to recover. In particular, the U.S. economy continued expanding and labor market conditions kept strengthening. Meanwhile, despite still remaining below the Federal Reserve target, inflation in that country went up, once the effects of the reductions in energy and imports prices vanished, and the degree of slack in the economy diminished. In this context, in its decision of February this Institute maintained the target range of the federal funds' rate unchanged. Nevertheless, it is anticipated that the process of the

monetary stance normalization will be carried out at a faster rate than it was expected prior to the December meeting. This estimation partly reflects the announcements by the new U.S. administration regarding its intention to set in motion an ambitious fiscal expansion, particularly undertaking reforms to the fiscal policy and a higher spending on infrastructure, along with a set of deregulation measures. Meanwhile, in the Euro area, the U.K. and Japan, a greater dynamism of the economic activity was observed and inflation rebounded, reason why deflationary concerns in these economies subsided, and hence less accommodative monetary policies may be adopted in the referred countries. On the other hand, emerging economies faced a scenario of great uncertainty, in particular given the fiscal, trade and migration policies contemplated by the new U.S. administration. This could cause lower trade and foreign direct investment at the global level, and, along with a faster-than-expected rate of the monetary policy normalization of the Federal Reserve, it could trigger a tightening of global financial conditions.

As regards the domestic economy, in the fourth quarter of 2016, productive activity kept expanding, although at a lower rate with respect to the previous quarter. In particular, external demand continued recovering, and private consumption maintained a positive trend. However, the performance of investment remained weak. In this context, no significant aggregate demand-related pressures onto prices have been observed. Furthermore, in the reference quarter there was an adjustment in external accounts that implied a significant reduction in the trade balance and current account deficits. Nevertheless, the improvement in the labor market has been translated into higher labor unit costs, albeit still at low levels relative to those observed prior to the global financial crisis. In this juncture, during 2016 as a whole the Mexican economy grew 2.1 percent based on seasonally adjusted data (2.3 percent based on data without seasonal adjustment).

For 2017 and 2018, a moderate upturn is still expected in the world economy, in part, due to the afore mentioned expectation of more expansionary policies implemented by the incoming U.S. government. However, the economic policy proposals of this new administration suggest that the U.S. will implement protectionist measures that could affect their trade relations with the world, which will remain an element of risk to the recovery of the global economy, and to the performance of the Mexican economy, in particular. Indeed, despite the prevailing uncertainty over the scope and the magnitude and timing of the said measures, the central growth scenario presented in this Report considers the materialization of some of these risks. In light of this, the forecasts for the next two years are revised downwards to incorporate a deterioration in the expected trade flow between Mexico and the U.S. and a lower foreign direct investment, as compared to that previously anticipated. Thus, the forecast interval for the GDP growth in 2017 is adjusted from between 1.5 and 2.5 percent as estimated in the previous Report to one between 1.3 and 2.3 percent in the current one, while the GDP growth forecast for 2018 is adjusted from a rate of 2.2 to 3.2 percent in the previous Report to one of between 1.7 and 2.7 percent in the present one. These forecasts should be taken with caution, as they should be reviewed once more information is available regarding the direction of the negotiations on the bilateral relation between Mexico and the U.S.

As previously stated, in January 2017, annual headline inflation spiked, in view of the modifications in the price determination of some energy prices, especially thouse of gasoline. Indeed, in the framework of this fuel’s price liberalization

process that is to take place throughout 2017, on December 27, 2016 the Ministry of Finance announced that maximum prices for gasoline will be established as of January 1, 2017, will be determined based on a formula that was applied across the regions where these prices have not been liberalized yet. In the said formula, the value of this fuel's international prices, converted to Mexican pesos, continued to directly enter the calculation of the said maximum prices, excluding the upper and the lower limits between which the maximum gasoline price was allowed to fluctuate in 2016. In an environment of upward adjustments in international gasoline references and a considerable depreciation of the domestic currency, this change in the determination of maximum gasoline prices implied a considerable price increment in January 2017, which generated a significant, although transitory, impact on inflation. In this context, the monetary authority has remained alert seeking to prevent second round effects, derived from the referred shocks, from affecting inflation. In subsequent communications, the Ministry of Finance announced that the maximum prices announced in December 2016 would be in force until February 17, 2017 and that starting from the following day the maximum prices applicable to each region would be adjusted on a daily basis in line with the new formula which, although still considering the prices of international references converted to the Mexican pesos, seeks to moderate the impact of excessive fluctuations in these references.

It is expected that changes in the relative prices of merchandise with respect to those of services, derived from the depreciation of the real exchange rate and the impact of the gasoline price liberalization, will temporarily affect headline inflation. This reflects the fact that, as mentioned above, the monetary policy will focus on preventing second round effects from affecting the price formation process of the economy. Thus, for 2017 headline inflation is expected to lie above the upper limit of the variability interval associated to the target set by Banco de México, resuming its convergence trend towards the referred target over the last months of the year, and closing 2018 around 3 percent. In turn, core inflation is expected to remain above its 3 percent target in 2017. However, for the last months of 2017 and in 2018 it is estimated to resume its trend of convergence towards the 3 percent target. Thus, both headline and core inflations are expected to converge to the target again, once the effects of the said shocks start fading, and the already implemented monetary policy actions along with those adopted in 2017 take effect, all this in an environment in which no aggregate demand-related inflation pressures are anticipated.

The environment of uncertainty currently faced by the Mexican economy makes it especially relevant for the authorities to reinforce the macroeconomic fundamentals of the country, strengthening public finances and adjusting the monetary policy stance in a timely fashion, while proceeding with the adequate implementation of structural reforms. In this sense, the favorable results observed in the fourth call of Round One of public tenders in hydrocarbon exploration and extraction and in the first call to formalize partnerships of private sector with Pemex, as well as the liberalization of gasoline prices should be highlighted, as they represent progress in strengthening the macroeconomic framework of the country. In particular, the referred liberalization stands out due to the reduced vulnerabilities it represents for public finances, as maintaining public prices that are misaligned in reference to their international counterparts is not sustainable. Furthermore, a solid fiscal stance is essential to strengthen the macroeconomic framework and helps to reduce the perception of risk in the economy, creating an environment more conducive to

growth and price stability in the medium and long terms. In this context, the Federal Government's goal to attain a primary surplus in public finances in 2017 plays a key role. It is also relevant to specify that within the process of structural reforms the public-private partnership project "*Red Compartida*" stands out, as it seeks to increase telecommunication services coverage, raise their quality, and promote competitive prices in these services.

In the future, the Board of Governors will closely monitor the evolution of all inflation determinants and its medium- and long-term expectations, especially the possible pass-through of exchange rate adjustments and gasoline prices onto the rest of prices. Likewise, it will be watchful of the monetary position of Mexico relative to the U.S., and the evolution of the output gap. This will be done in order to continue taking the necessary measures to consolidate the efficient convergence of inflation to its 3.0 percent target.

# 2. Recent Evolution of Inflation

## 2.1. Inflation

The moderate upward trend (that annual headline inflation had presented since July 2016) persisted in the fourth quarter of 2016. A further depreciation of the national currency in this period was especially relevant in this, as a consequence of the complex external environment faced by the Mexican economy, above all during the period following the elections in the U.S. This depreciation has been manifested through the adjustment in the relative prices of merchandise with respect to services, which contributed to maintaining an upward trend of core inflation. Meanwhile, in the reported quarter the non-core component also exhibited greater growth rates, associated to price increments of some agricultural products, as well as some energy products, as was the case of gasoline at the Northern border. Consequent on this, as of October 2016 headline inflation slightly exceeded its 3 percent target, after remaining below this level for seventeen consecutive months. Specifically, in December 2016 annual headline inflation reached 3.36 percent.

Subsequently, measures tending to the liberalization of some energy prices, the implementation of which started in early 2017, as is the case of gasoline and L.P. gas prices, strongly affected the Consumer Price Index (CPI), as the annual change of the non-core component spiked. It should be pointed out that, even though the effects of the liberalization of energy prices onto inflation measured in the short term were important, they are expected to be temporary, while the monetary policy will seek to prevent second round effects (generated by these changes in relative prices) from affecting the price formation process in the economy.

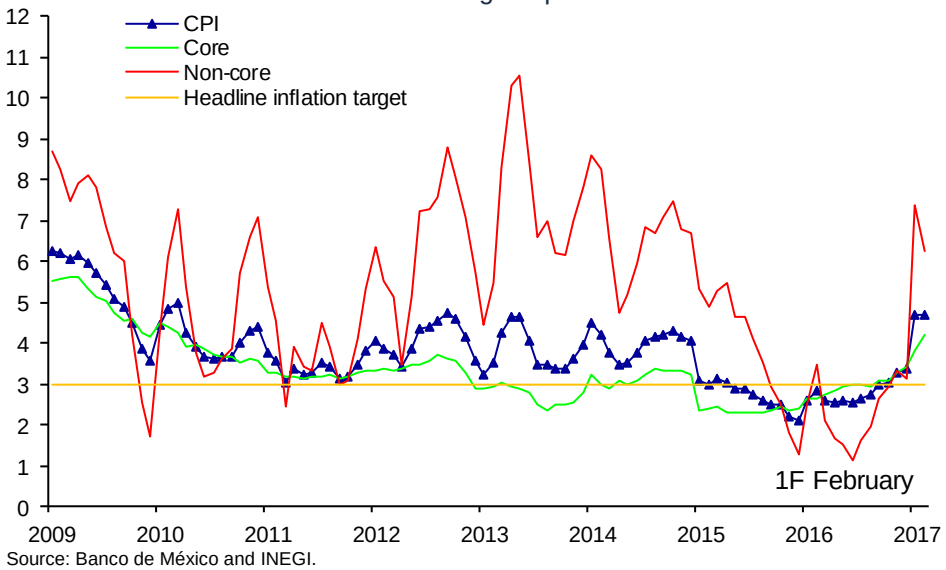
As a result of the afore mentioned developments, annual headline inflation shifted from an average of 2.78 percent in the third quarter of 2016 to 3.24 percent in the fourth one. In the first fortnight of February, inflation lied at 4.71 percent. It should be noted that in the former figure 1.35 percentage points are directly associated to the increments in gasoline prices, which, in turn, resulted from the increases in the international references of this fuel and from the exchange rate depreciation. This figure shows the relevance of the impact of the change in the determination of maximum prices of these fuels onto inflation. Meanwhile, average annual core inflation changed from 3.00 to 3.28 percent between the referred quarters, while in the first fortnight of February it lied at 4.20 percent. Likewise, the average annual change of the non-core component went from 2.10 to 3.14 percent between the third and the fourth quarters of 2016, attaining 6.25 percent in the first fortnight of February. As stated before, the latter mainly resulted from price increments in gasoline and domestic gas L.P. (Table 1 and Chart 1). Notably, so far only some normal indirect and expected effects generated by price increases in these energy products have been observed on the prices of goods and services that use them as inputs (see Box 1).

**Table 1**
**Consumer Price Index, Main Components and Trimmed Mean Indicators**
Annual change in percent

| | 2015 | | 2016 | | | | 2017 |
|---|---|---|---|---|---|---|---|
| | III | IV | I | II | III | IV | 1f February |
| **CPI** | **2.61** | **2.27** | **2.69** | **2.56** | **2.78** | **3.24** | **4.71** |
| **Core** | **2.33** | **2.40** | **2.69** | **2.91** | **3.00** | **3.28** | **4.20** |
| **Merchandise** | **2.46** | **2.78** | **3.04** | **3.51** | **3.79** | **3.98** | **5.27** |
| Food, beverages and tobacco | 2.20 | 2.55 | 2.88 | 3.69 | 3.89 | 4.26 | 5.88 |
| Non-food merchandise | 2.67 | 2.98 | 3.17 | 3.36 | 3.71 | 3.75 | 4.77 |
| **Services** | **2.22** | **2.09** | **2.40** | **2.41** | **2.34** | **2.68** | **3.29** |
| Housing | 2.06 | 2.00 | 2.11 | 2.21 | 2.32 | 2.40 | 2.53 |
| Education (tuitions) | 4.37 | 4.28 | 4.21 | 4.13 | 4.17 | 4.26 | 4.41 |
| Other services | 1.75 | 1.52 | 2.15 | 2.09 | 1.80 | 2.50 | 3.75 |
| **Non-core** | **3.53** | **1.87** | **2.71** | **1.46** | **2.10** | **3.14** | **6.25** |
| **Agriculture** | **5.33** | **2.76** | **6.51** | **4.48** | **3.81** | **4.98** | **-2.92** |
| Fruit and vegetables | 7.91 | 6.33 | 22.45 | 13.30 | 8.58 | 8.32 | -12.89 |
| Livestock | 4.00 | 0.84 | -1.60 | -0.01 | 1.26 | 3.09 | 3.60 |
| **Energy and government approved fares** | **2.42** | **1.33** | **0.39** | **-0.45** | **1.01** | **2.00** | **12.26** |
| Energy | 2.43 | 0.52 | -1.10 | -1.49 | -0.03 | 1.75 | 16.85 |
| Government approved fares | 2.39 | 2.86 | 3.23 | 1.41 | 2.83 | 2.48 | 3.85 |
| **Trimmed Mean Indicator** [1/] | | | | | | | |
| CPI | 2.62 | 2.45 | 2.50 | 2.66 | 2.91 | 3.22 | 4.22 |
| Core | 2.69 | 2.77 | 2.85 | 3.05 | 3.20 | 3.28 | 4.05 |

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

**Chart 1**
**Consumer Price Index**
Annual change in percent



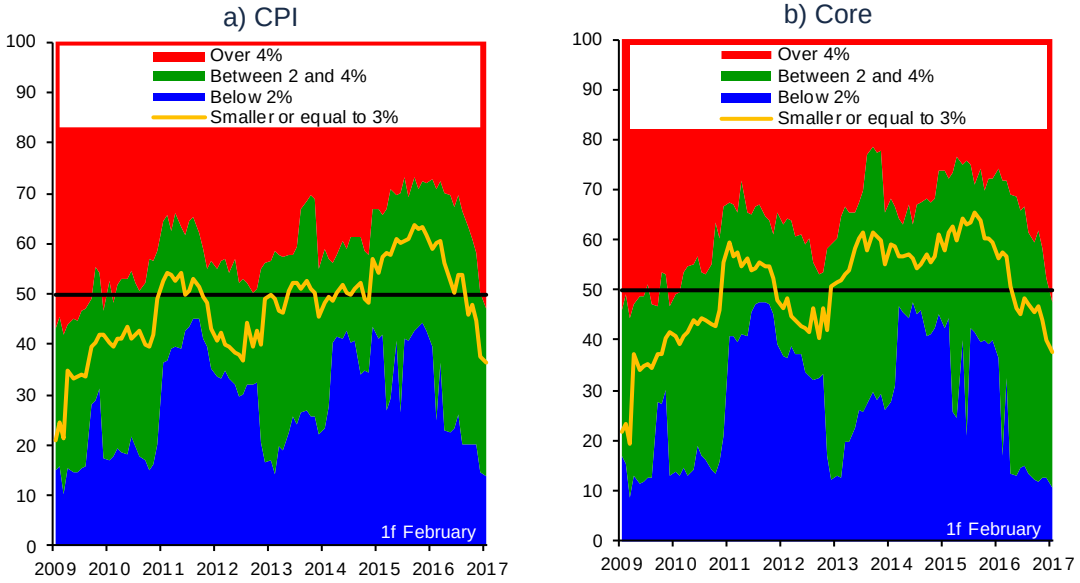

Source: Banco de México and INEGI.

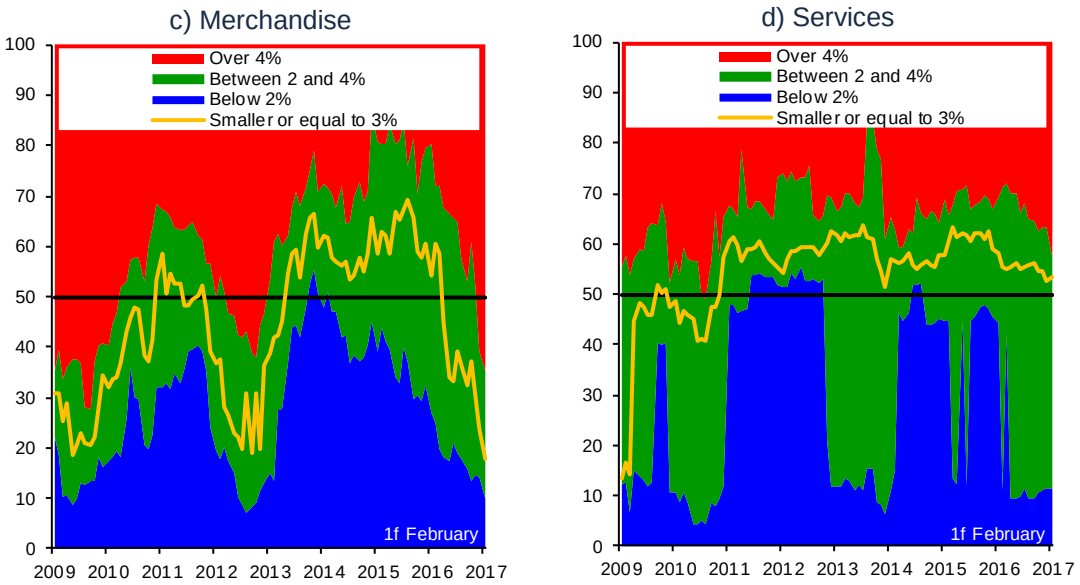
A more detailed analysis of the headline and core inflation trends, as well as its performance at the margin, can be obtained based on the following indicators. Firstly, the proportion of the CPI basket and the core component is presented, exhibiting annual price changes in three groups: i) items with an annual price change below 2 percent; ii) between 2 and 4 percent; and iii) over 4 percent. In the same vein, the percentage of the CPI basket and the core component are illustrated

in two additional categories: the one with annual price changes lower or equal to 3 percent, and the one with annual price changes over 3 percent (Chart 2).

This indicates that the proportion of headline and core baskets with price increments lower than 4 percent has presented a downward tendency (Chart 2a and Chart 2b). Thus, in the third quarter of 2016 the share of the CPI basket of goods and servcies with price increments below 4 percent was on average 68 percent, while in the fourth quarter it was 61 percent. For the core component, the shares were 65 and 60 percent in the same quarters. Likewise, the share of the CPI basket with price changes lower or equal to 3 percent (the area below the yellow line) was 53 percent in the third quarter of 2016, plunging to 46 percent in the fourth quarter, while in the case of the core component, this share changed from 47 to 45 percent in the same time frame. Furthermore, an analysis similar to the one prepared above for the baskets of merchandise and services of the core index (Chart 2c and Chart 2d) shows that, as a result of the depreciation of the exchange rate of the national currency and the consequent change in the relative prices of merchandise with respect to services, it was precisely the prices of the former that have recently presented a considerable decrease in the share of their basket with price increments lower than 4 percent, while this share for the services basket has remained relatively stable. In the same way, the share of the basket with price changes lower or equal to 3 percent has been diminishing in the case of the merchandise, while that of the services still persists above 50 percent.

**Chart 2**
**Percentage of CPI Basket according to Intervals of Annual Increments**
Percent



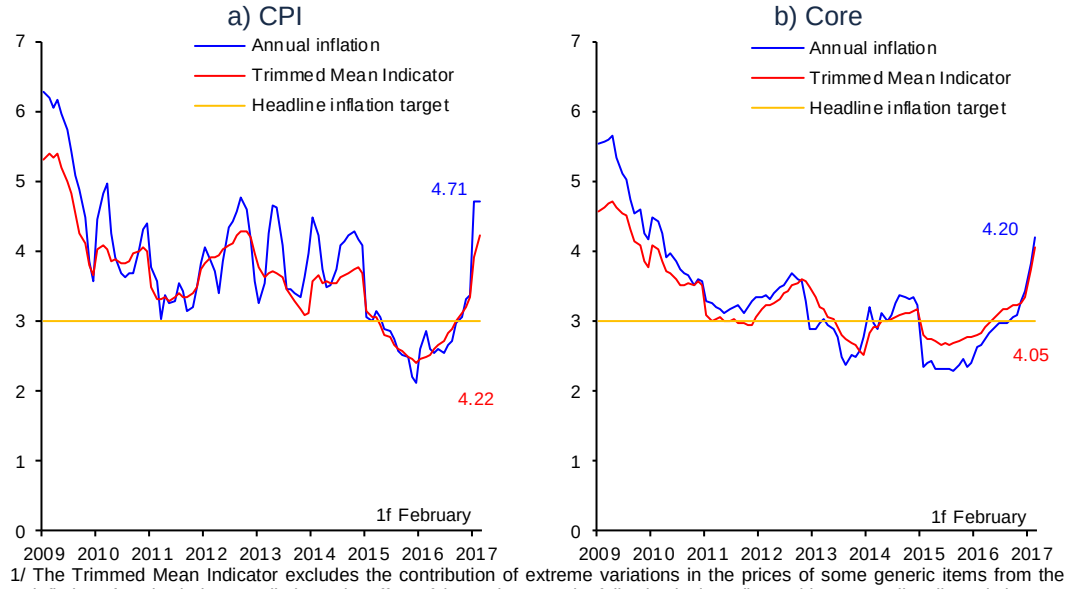



Source: Banco de México and INEGI.

Meanwhile, the medium-term trend of headline inflation represented by the Trimmed Mean Indicator shifted from 2.91 to 3.22 percent between the third and the fourth quarters of 2016, marking 4.22 percent in the first fortnight of February. Likewise, the referred indicator for core inflation went up from 3.20 to 3.28 percent in the same time frame, attaining 4.05 percent in the first fortnight of February. The quarterly increase observed in these indicators was largely due to the adjustment in the relative prices of merchandise with respect to services. On the other hand, even though in the first fortnight of February both the Trimmed Mean Indicator for headline and for core inflations increased further, their levels lied below the observed figures, which indicates that the registered increment in headline and core inflations measured in this fortnight was mainly due to the price rise in a relatively small group of goods and services, especially increments in energy prices (Chart 3 and Table 1).

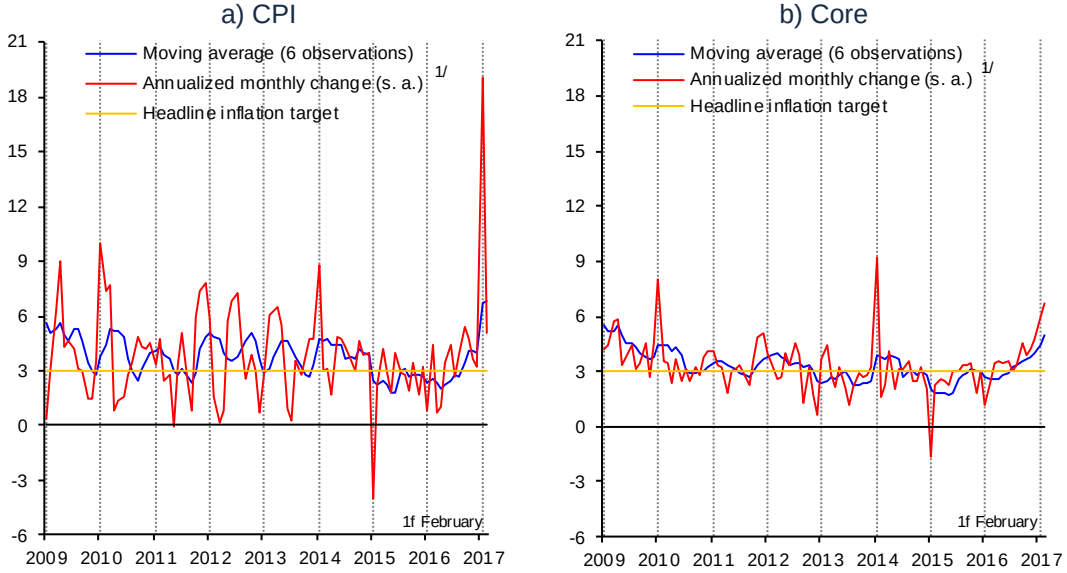
On the other hand, the evolution of annualized monthly (seasonally adjusted) inflation shows that, once the comparison base effects are discounted, the headline inflation trend has increased. This resulted from increments in the relative prices of merchandise, which are also reflected in the same sense in the tendency of the respective indicator of core inflation. Likewise, this analysis shows that, at the margin, headline inflation was notably affected, even though it was temporary, by the afore mentioned adjustment in energy prices (Chart 4).

**Chart 3**
**Price Indices and Trimmed Mean Indicators 1/**
Annual change in percent




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.

**Chart 4**
**Annualized Seasonally Adjusted Monthly Change and Trend**
Percent



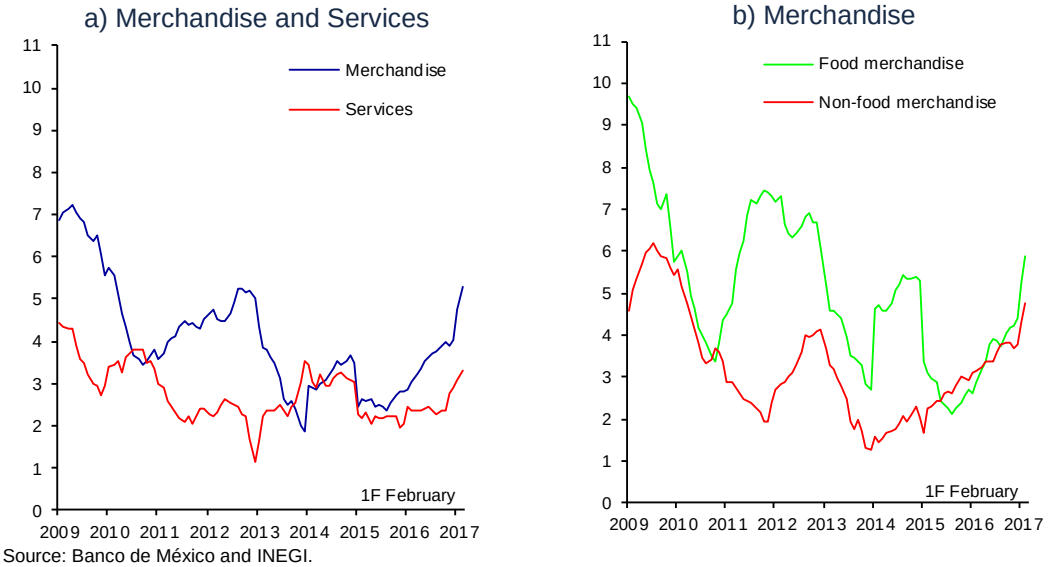

s. a. / Seasonally adjusted data.
1/ For the last observation, the annualized biweekly change is used.
Source: Seasonal adjustment prepared by Banco de México with own data and data from INEGI.

Within core inflation, the following should be noted:

i. The merchandise price subindex shifted from an average annual change of 3.79 to 3.98 percent between the third and the fourth quarters of 2016, and marked 5.27 percent in the first fortnight of February. In this respect, the acceleration in the annual growth rates of food merchandise prices was noteworthy, as they changed from 3.89 to 4.26 percent in the referred quarters, and marked 5.88 percent in the first fortnight of February, while non-food merchandise prices persisted at similar levels between the third and the fourth quarters of 2016, observing 3.71 and 3.75 percent, and later went up to 4.77 percent in the first fortnight of February (Chart 5a and Chart 5b). In particular, in the said fortnight some price increases in corn tortilla and sweet bread stood out, as they were associated to higher costs of some inputs.

ii. In contrast, the subindex of services prices kept exhibiting moderate annual growth rates, even though in the fourth quarter it increased slightly, derived from the absence of reductions of the same magnitude in mobile phone tariffs, which were observed last year. Thus, between the third and the fourth quarters of 2016, their average annual change rose from 2.34 to 2.68 percent, observing 3.29 percent in the first fortnight of February. In particular, in the latter period, prices of different food services went up, as a result of higher input costs, such as some food products and L.P. gas. In this way, the annual change of the item of services other than housing and education rose from 1.80 to 2.50 percent between the third and the fourth quarters of 2016, reaching 3.75 percent in the first fortnight of February (Chart 5a).

**Chart 5**
**Core Price Index**
Annual change in percent




Source: Banco de México and INEGI.

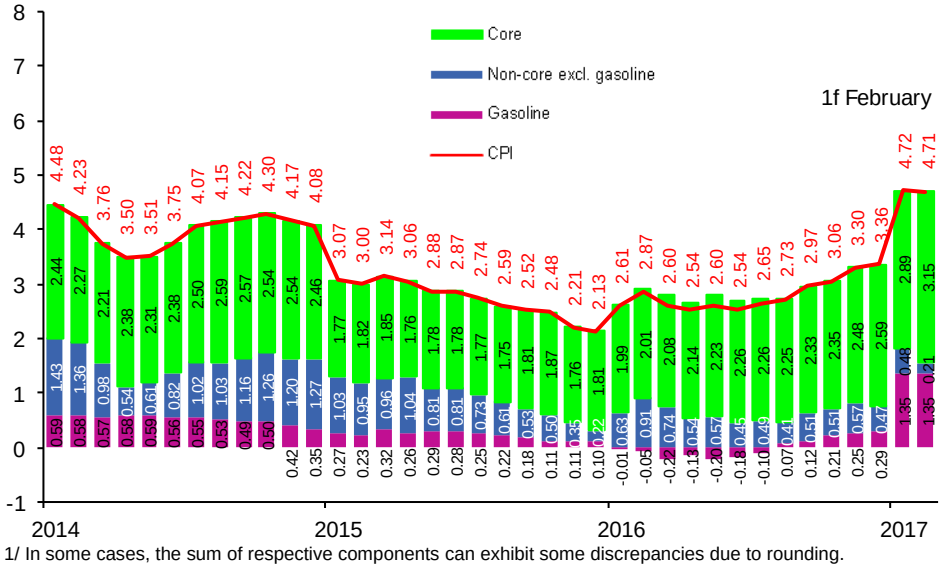
As compared to the previous quarter, the annual change rate of the non-core component increased in the fourth quarter. This result was due to price increases in some livestock products and to higher growth rates in the prices of energy

products and government approved fares. Subsequently, considering the changes in the determination of some energy prices that came into force in January 2017, the non-core component was the one that registered a more marked acceleration in its annual growth rate, as well as a high impact on headline inflation in that month, generating a strong effect in the first fortnight of February as well (Chart 6 and Table 1).

i. The average annual change of the subindex of agricultural products' prices shifted from 3.81 to 4.98 percent between the third and the fourth quarters of 2016. Higher prices in some livestock products, such as chicken and pork, as well as smaller reductions in egg prices were especially noteworthy. Afterwards, the annual change of agricultural products' prices lowered considerably and located at -2.92 percent in the first fortnight of February. This was mainly due to the reductions in some vegetables' prices, such as tomato and onions.

ii. The subindex of energy prices and government approved fares accelerated its average annual growth rate between the third and the fourth quarters, shifting from 1.01 to 2.00 percent. However, in the first fortnight of February, its annual change rate reached 12.26 percent. As mentioned above, this evolution is fundamentally attributed to the higher prices of gasoline and L.P. gas. At the same time, higher fuel prices caused upward adjustments in public transport fares across different cities of Mexico.

**Chart 6**
**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.

With respect to the last point, it is relevant to highlight that:

i. As regards gasoline, in the framework of the process to liberalize its price, on December 21, 2016, the Energy Regulatory Commission (CRE, for its acronym in Spanish) released a timetable to carry out this process, which

indicates a gradual liberalization throughout 2017, which would conclude by determining them without government intervention across the country by the end of the year. Subsequently, on December 27, 2016, the Ministry of Finance announced that Mexico would be divided into 90 regions in which maximum gasoline prices will be regulated. In the same line, it published the formula to determine maximum prices, which will be applied in the regions, where the prices will not be liberalized during the process. The most relevant point in determining maximum gasoline prices is that this fuel's international references, converted to the Mexican pesos, are still directly considered in the mentioned formula, but the upper and the lower bounds, between which this price was allowed to fluctuate during 2016, are eliminated. This change implied spikes in this fuel's prices in January 2017, which, as mentioned above, were manifested in inflation measured in that month. Thus, for instance, considering average annual inflation of the third and the fourth quarters of 2016 (2.78 and 3.24 percent), 0.03 and 0.25 percentage points were due to gasoline price increments, while in January, gasoline contributed with 1.35 percentage points to the annual inflation of 4.72 percent. An update to maximum gasoline prices was programmed for February 4, 2017. However, a day earlier the Ministry of Finance announced that these prices would remain unchanged between February 4 and February 17, and the maximum prices announced on December 27, 2016 would remain in force. To do so, the Ministry of Finance modified the fiscal stimuli, in particular the excise tax applicable to gasoline. Subsequently, on February 17 the said Ministry determined that as of the following day, the maximum gasoline prices applicable to each region will be adjusted on a daily basis, using a new formula which, although still contemplates the prices of the international references converted to the Mexican pesos, seeks to mitigate the effect of excessive fluctuations in the said references. Thus, the goal of the gradual liberalization of gasoline prices throughout 2017 and the new determination of maximum prices is to help transition from the scheme of gasoline prices established by the authorities to a scheme in which they are mainly determined by the evolution of their international counterparts. In the first fortnight of February, annual headline inflation was 4.71 percent, in which 1.35 percentage points were also associated to gasoline price increments carried out at the beginning of the year.

ii. With respect to L.P. gas, during 2016 this fuel's prices started to move towards liberalization. Even though in 2016 the Ministry of Finance still used to set maximum prices, imports of this fuel were allowed and Pemex was no longer the only supplier. Starting from January 1, 2017, the price set by the authority disappeared. Thus, in January, the increment in this fuel was 17.85 percent as compared to last December. It should be noted that while the domestic consumer price of this hydrocarbon lies above the international reference of the L.P. gas, additional measures could be required to make its domestic price competitive. In this context, on February 15, 2017 the CRE announced its collaboration with the National Association of Supermarkets and Department Stores (ANTAD) to enable the sales of L.P. gas in supermarkets, which could boost competition in this market and, hence, lower consumer prices of this energy product. In

the first fortnight of February, the annual change of this fuel marked 7.52 percent.

iii. In 2016, low consumption electricity tariffs for domestic sector decreased 2 percent, while in 2017 they are expected to remain unchanged. Meanwhile, high consumption electricity tariffs for domestic use have been increasing since June 2016, presenting an annual change of 23.8 percent in December 2016 and the monthly changes of 2.6 percent in January 2017 and of 3.8 percent in February. This performance is related to higher prices of inputs used to generate electric power, especially fuels.

iv. The price of the natural gas is determined based on its international reference, and in the first fortnight of February it presented an annual change of 31.12 percent.

## Box 1
## Indirect Effects of Energy Price Increments onto the Price Formation Process of the Mexican Economy

### 1. Introduction

This Box presents the analysis of the impact that the recent increments in energy prices have had so far on the price dynamics of the goods and services that are part of the Consumer Price Index (CPI). In particular, the evolution of the share of products of the CPI basket with upward price adjustments, as well as the magnitude of these increments in 2017 are studied. Although the analysis covers the period up to the first half of February, the results suggest that the adjustment in response to the referred shock in the proportion and the magnitude of price increments occurred fundamentally during the first fortnight of January 2017. In particular, in the referred fortnight both the share of goods and services with price increments and their average magnitude increased, with respect to previous years. The increment in the magnitude of price rises is attributed to the non-core component, given that in the case of the core one the magnitude of price increments has remained close to the average registered in recent years. Furthermore, it stands out that the average magnitude of price increments has been diminishing since the second fortnight of the year. Moreover, the evolution of the share of goods and services of the CPI with upward price adjustments has been very similar to that registered in the previous episodes in which there were supply shocks in the economy, which affected a relatively broad set of goods and services.

On the other hand, using the input-output matrix, the indirect effects derived from energy price increments on headline and core inflation are estimated. The results of these estimates suggest that the adjustment in prices so far has been orderly and as anticipated. That is, it can be argued that energy price increments have not generated indirect effects beyond their natural impact and beyond the expected magnitude on the prices of goods and services that use them as inputs. Thus, the referred increments do not seem to have led to an environment of more widespread price increases in the Mexican economy.

### 2. Recent Inflation Trends

In early 2015, as a result of the monetary policy conduction and lower prices of widely-used inputs, some of them as a consequence of the structural reforms, annual headline inflation practically attained the target set by Banco de México. This occurred despite the depreciation that the national currency had registered since the previous year. Moreover, since May 2015 annual headline inflation accumulated 17 consecutive months persisting at levels below 3 percent, marking a historic minimum of 2.13 percent in December that year.

Despite this, and considering the magnitude of the depreciation of the national currency, as well as a long period over which it occurred, since July 2016 annual headline inflation started to observe an upward trend, which was largely a reflection of the impact of the depreciation of the national currency on the relative prices of merchandise with respect to services, which increased the growth rate of core inflation. Even considering this, in December 2016, annual headline inflation located close to the permanent target, marking 3.36 percent.

In January 2017, the upward trend of inflation was exacerbated by modifications in the determination of some energy prices, such as gasoline and L.P. gas. This occurred in an environment of the transition from the prices set by the authorities to a scheme in which prices are determined by the free market. However, in a juncture of increments of their international references and of the depreciation of the national currency, the measures tending to the liberalization of the said energy prices strongly affected inflation. Therefore, annual headline inflation marked 4.71 percent in the first fortnight of February 2017. It should be stressed that 1.64 percentage points in this figure are directly related to the energy price increment, and, specifically, as mentioned in this Report, 1.35 percentage points correspond to the rise in gasoline prices (Table 1).

**Table 1**
**Contributions to Annual Headline Inflation**
Change in percent and impact in percentage points

| Item | Change | | | Incidence | | |
|---|---|---|---|---|---|---|
| | Dec 2016 | Jan 2017 | 1F Feb 2017 | Dec 2016 | Jan 2017 | 1F Feb 2017 |
| **CPI** | **3.36** | **4.72** | **4.71** | **3.36** | **4.72** | **4.71** |
| **Core** | **3.44** | **3.84** | **4.20** | **2.59** | **2.89** | **3.15** |
| Merchandise | 4.05 | 4.75 | 5.27 | 1.40 | 1.64 | 1.81 |
| Food | 4.40 | 5.27 | 5.88 | 0.69 | 0.83 | 0.92 |
| Non-food merchandise | 3.76 | 4.31 | 4.77 | 0.71 | 0.81 | 0.90 |
| Services | 2.92 | 3.07 | 3.29 | 1.19 | 1.25 | 1.34 |
| Housing | 2.41 | 2.46 | 2.53 | 0.44 | 0.45 | 0.46 |
| Education | 4.26 | 4.29 | 4.41 | 0.23 | 0.23 | 0.24 |
| Other services | 3.04 | 3.33 | 3.75 | 0.52 | 0.57 | 0.64 |
| **Non-core** | **3.13** | **7.40** | **6.25** | **0.77** | **1.83** | **1.55** |
| Agriculture and livestock | 4.15 | 0.53 | -2.92 | 0.39 | 0.05 | -0.29 |
| Fruit and vegetables | 4.31 | -6.01 | -12.89 | 0.15 | -0.23 | -0.50 |
| Livestock | 4.06 | 4.67 | 3.60 | 0.24 | 0.28 | 0.21 |
| Energy and government appr. fares | 2.49 | 11.80 | 12.26 | 0.38 | 1.78 | 1.84 |
| Energy | 2.42 | 16.31 | 16.85 | 0.24 | 1.59 | 1.64 |
| Gasoline | 5.57 | 26.04 | 26.21 | 0.29 | 1.35 | 1.35 |
| Domestic gas | -4.20 | 8.05 | 10.14 | -0.11 | 0.17 | 0.21 |
| Electricity | 1.14 | 3.14 | 3.28 | 0.05 | 0.08 | 0.08 |
| Government approved fares | 2.60 | 3.50 | 3.85 | 0.14 | 0.19 | 0.20 |

Source: Banco de México and INEGI.

Even though the effects of the referred process of price liberalization onto short-term inflation are considerable, as regards the changes in the relative prices, these effects are anticipated to dissipate over time, as the monetary policy will be on alert seeking to prevent second round effects on the price formation process of

the economy. Nevertheless, it is normal and to be expected that energy price increments can produce indirect effects on the prices of other goods and services that use them as inputs.

### 3. Stylized Facts of the Price Formation Process of the Mexican Economy

In recent economic literature there are various works analyzing the characteristics of the price formation process of an economy and its relation with inflation. These works use price databases collected to estimate price indices, based on which a series of indicators is developed, allowing a better comprehension of the price setting process. Among the said indicators, the following can be found: the share of prices of the CPI basket that changes in each period, which is referred to as the *price change frequency*, and the size of these changes, which is referred to as the *magnitude of price changes*. It is significant because, following the works of Klenow and Kryvtsov (2008) and Gagnon (2007), among others, these indicators allow to analyze inflation fluctuations ($\pi_t$) through the following decomposition:

$$\pi_t = fr_t^{+} dp_t^{+} + fr_t^{-} dp_t^{-}$$

where, $fr_t^{+}$ and $fr_t^{-}$ represent the frequencies of price increases and price decreases, respectively, while $dp_t^{+}$ and $dp_t^{-}$ refer to the magnitudes of price increases and decreases, in the same order. Thus, headline inflation can be decomposed into the sum of the frequency of price increases multiplied by their magnitude and the frequency of decreases by their magnitude.

The previous decomposition implies that in light of shocks affecting demand or the costs of different goods and services produced in the economy, firms can adjust the frequency at which they modify their prices, the magnitude of the changes, or both of the above. In the case of the U.S., Klenow and Kryvstov (2008) and Berger and Vavra (2015) find that fluctuations in the magnitudes of price changes account for most changes in inflation, which implies that the intensive margin is the one that dominates the inflation dynamics, over the extensive margin, which corresponds to the adjustments in the frequency of price changes. In the case of Mexico, there is also evidence showing that most fluctuations in inflation are explained by changes in the intensive margin.[1]

Table 2 exhibits the correlation between inflation and the frequency of price changes, along with the correlation between inflation and the magnitude of price changes for the CPI and its main components. The results show that for the period from January 2011 to the first fortnight of February 2017, inflation is more correlated with the magnitude of price changes than with the frequency of price changes, thus reinforcing the dominance of the intensive margin.

**Table 2**
**Correlation with Inflation**

| | Correlation coefficient | |
|---|---|---|
| | Frequency of price changes (fr) Jan11 - 1FFeb17 | Magnitude of price changes Jan11 - 1FFeb17 |
| CPI | 0.24 | 0.92 |
| Core | 0.52 | 0.90 |
| Non-core | 0.13 | 0.89 |

Source: Calculated by Banco de México with own data and data from INEGI.

Despite the above, earlier studies of the Mexican case indicate that in view of supply shocks, such as those associated to energy price increments, which could affect the relative prices and costs of a relatively broad set of goods and services, the adjustment in inflation initially occurs via changes in the frequency of price increments.[2] That is, temporarily there is an increment in the number of goods and services that exhibit price adjustments. In particular, in response to fiscal adjustments in 2010 and in 2014, the frequency of price increments rose at the moment of the shock and subsequently resumed the average level several months after.

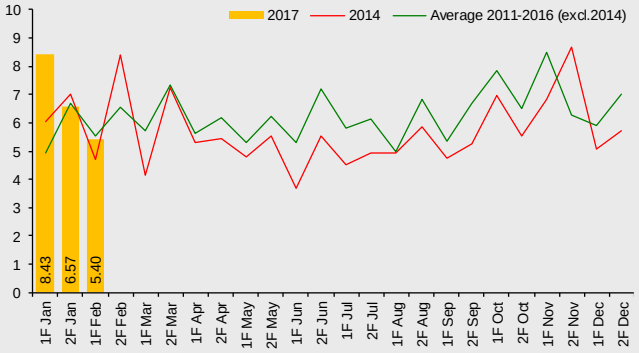
Charts 1a and 1b exhibit the magnitudes and frequencies of price increments for the CPI across different fortnights and years. The years 2014 and 2017 are presented separately, since significant shocks were registered in these years. In the former case, due to the fiscal adjustments in high-calorie density foods and the equalization of VAT in the border region and, in the second case, derived from the increments in gasoline and L.P. gas prices, as a result of the process of price liberalization. It should be pointed out that in the current episode, the brunt of the adjustment was registered in the first fortnight of the year. In particular, as can be appreciated in the referred charts, in the first fortnight of January 2017 both the magnitude and the frequency of price increments exceeded the average level for the period from 2011 to 2016, except for 2014. Afterwards, the average magnitude of price increments was declining starting from the second fortnight of January 2017, locating at levels close to the average in the period from 2011 to 2016, excluding 2014. As regards the

[1] See Banco de México (2011). "Features of the Price Formation Process in Mexico: Evidence from CPI Micro Data", in the Technical Chapter of the Inflation Report October – December 2011, p. 57 -75, and Banco de México (2013). "Relative Price Changes and Inflation Convergence towards the 3 Percent Target", in the Box 1 of the Inflation Report April – June 2013, pp. 5-8.

[2] See Banco de México (2010). "Evidence on the Absence of Second-round Effects on the Price Formation Process Associated with the Tax Adjustments for 2010 Approved by Congress", in Box 1 of the Inflation Report January – March, 2010, pp. 6-7.

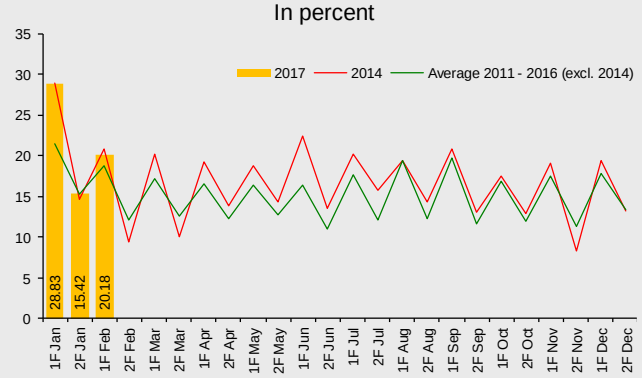
frequency of price increments, their dynamics were similar to those of 2014, when the effects of the fiscal adjustments were perceived in the price setting process of the economy.[3]

**Chart 1a**
**Magnitude of Price Increments in Headline Inflation**
In percent




Source: Banco de México and INEGI.

**Chart 1b**
**Frequency of Price Increments in Headline Inflation**
In percent




Source: Banco de México and INEGI.

Tables 3 and 4 show that the growth of the magnitude of price increments in the CPI in the first fortnight of January 2017 is attributed to the non-core component, given that its magnitude of increases is greater than in the previous years, while in the case of the core component it is similar to the average of the period 2011 – 2016, excluding 2014, and it is even lower when comparing the second fortnight of January and the first fortnight of February. This evolution of the non-core component is mainly explained by the direct effects of gasoline and L.P price increments. As regards the frequency of price changes, this indicator is greater during the first fortnight of January 2017, both in its non-core and core components relative to the average of the last years. In the first case, this adjustment resulted from direct effects generated by the referred energy price increments, while in the case of the core component the growth is fundamentally explained by the higher cost of some goods and services derived both from the increments in energy prices and the depreciation of the national currency. Thus, when comparing the frequency of changes of the first fortnight of January both of 2017 and 2014 with the average of the period 2011-2016, excluding 2014, it can be appreciated that in light of supply shocks that affect a relatively broad set of goods and services, the adjustment in core inflation mainly occurs through the modifications in the frequency of price increments. In other words, when a shock affects costs faced by businesses in a widespread manner, it leads to a higher number of price adjustments seeking to incorporate the effect of this shock. However, given that the impact on costs is not homogeneous across different sectors of the economy, the average magnitude of prices changes does not adjust as much as the frequency.

**Table 3**
**Magnitude of Price Increments** 1/

| | Magnitude of price increments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1F January | | | 2F January | | | 1F February | | |
| | 2017 | 2014 | Average 2011- 16 2/ | 2017 | 2014 | Average 2011- 16 2/ | 2017 | 2014 | Average 2011- 16 2/ |
| CPI | 8.4 | 6.0 | 4.9 | 6.6 | 7.0 | 6.7 | 5.4 | 4.7 | 5.5 |
| Core | 6.3 | 8.0 | 6.2 | 5.7 | 6.3 | 7.0 | 5.9 | 7.8 | 6.4 |
| Non-core | 10.5 | 4.2 | 4.2 | 9.4 | 8.9 | 7.0 | 4.6 | 3.1 | 5.4 |

1/ Data weighted according to the weight of each item.
2/ It excludes 2014.
Source: Calculated by Banco de México based on own data and data from INEGI.

**Table 4**
**Frequency of Price Increments** 1/

| | Frequency of price increments (fr+) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1F January | | | 2F January | | | 1F February | | |
| | 2017 | 2014 | Average 2011- 16 2/ | 2017 | 2014 | Average 2011- 16 2/ | 2017 | 2014 | Average 2011- 16 2/ |
| CPI | 28.8 | 28.9 | 21.4 | 15.4 | 14.7 | 15.3 | 20.2 | 20.8 | 18.8 |
| Core | 19.4 | 19.1 | 12.7 | 16.5 | 14.7 | 12.0 | 16.8 | 9.6 | 12.1 |
| Non-core | 53.5 | 54.7 | 43.8 | 12.7 | 14.7 | 23.6 | 29.0 | 50.2 | 35.8 |

1/ Data weighted according to the weight of each item.
2/ It excludes 2014.
Source: Calculated by Banco de México based on own data and data from INEGI.

## 4. Estimation of the Indirect Impact of Energy Price Increments

The above results indicate that so far no widespread price increments have been observed, as a result of higher energy prices. The increment in the proportion of upward price adjustments is congruent with the adjustment of the Mexican economy as a result of the previous supply shocks, such as the one in January 2014. In order to estimate the indirect effects generated by energy price increments on the prices of different sectors of the economy, as a consequence of higher input costs, the 2012 input-output matrix is used. In

[3] The frequency of price decreases has declined in 2017, relative to the average of the period 2011-2016, except for 2014. On the other hand, the magnitude of price decreases has gone up in the first fortnights of the year, as compared to the average of 2011-2016, excluding 2014.

particular, at the level of different goods and services comprising the core component of the CPI, this matrix is used to estimate the increment in costs of each item derived from higher energy prices. Once the estimates of the indirect effects are obtained, an indicator is created, called *accumulated inflation of costs*, which incorporates both the seasonal price increment of each month in the period, and the indirect impact of energy price increments. Table 5 compares this inflation of costs with the observed accumulated inflation of both the CPI index and the core index, along with the index of their components of merchandise and services.

**Table 5**
**Indirect Impacts of Energy Prices**

Data in percent

| | Observed accumulated inflation: 2F Dec 16 - 1F Feb 17 (A) | Accumulated inflation of costs: 2F Dec 16 - 1F Feb 17 (B) | Difference (A) - (B) |
|---|---|---|---|
| CPI | 2.10 | 1.97 | 0.13 |
| Core | 1.20 | 0.94 | 0.26 |
| Merchandise | 1.73 | 1.10 | 0.63 |
| Services | 0.76 | 0.82 | -0.06 |

Source: Calculated by Banco de México based on own data and data from INEGI.

The results indicate that accumulated headline inflation observed during the reference period is similar to the inflation of costs. The accumulated core inflation is slightly greater than the respective inflation of costs, which is explained by the dynamics of the inflation of merchandise. In particular, it was greater than the inflation of costs, while that of the services was slightly smaller. In the case of merchandise, the difference can be attributed to the impact of the depreciation of the national currency onto prices, while in the case of services, the lower increment relative to the inflation of costs can be related to the slackness prevailing in the economy, along with the greater rigidity of prices in that sector. Thus, given that the accumulated inflation in 2017 is very close to the inflation of costs, it can be argued that the adjustment that has been registered so far in the price formation process has been orderly and the indirect effects derived from energy price increments have tended to be very close to their natural and expected impacts on those goods and services that use them as inputs of production.

## 5. Final Remarks

The increase in headline inflation registered in 2017 is largely explained by higher prices of gasoline and L.P. gas. As regards the impact of these increments on the price formation process of the Mexican economy, the increases during the first fortnight of the year that occurred both in the share of the CPI with price increments and in their average magnitude are notable. However, it should be pointed out that the adjustment in the frequency and the magnitude of prices changes mainly took place during the first fortnight of the year. The magnitude of price increments has been decreasing as of the second fortnight of January, while the frequency of increments has observed a dynamics similar to that in 2014, when the effect of fiscal adjustments was manifested in the price formation process of the economy. Furthermore, the analysis of the frequency and the magnitude of price increments indicates that the adjustment in the latter indicator is explained by the non-core component, due to higher price increments of energy products relative to previous years, given that in the core component the magnitude of increases persisted at levels close to the average registered during the period of 2011 – 2016, with the exception of 2014.

On the other hand, the rise in the frequency of price increments is attributed to the performance of both non-core and core components. In the former case, the increment is accounted for by the referred increases in energy prices, while in the case of core inflation, the adjustment resulted both from higher costs of those goods and services that use the said fuels as inputs in their production, and from the depreciation of the national currency.

Hence, given that i) the greater part of the adjustment in the analyzed price statistics took place in the first fortnight of January 2017; ii) the increment in the magnitude of price increases of the first fortnight of January 2017 is accounted for by the dynamics of the non-core compoment; iii) the magnitude of price increments has been declining since the second fortnight of the year and the increment in the share of prices with upward revisions is congruent with previous episodes; iv) and the adjustment in the prices of goods and services so far has been congruent with the natural and expected impacts derived from the dynamics of energy prices, it can be inferred that so far energy price increments have not generated indirect effects beyond their natural and expected impact, and, in this context, no second round effects on the price formation process in Mexico have been generated.

## References

Berger, D. and Vavra, J. (2015). "Dynamics of the U.S. Price Distribution" NBER Working Papers 21732.

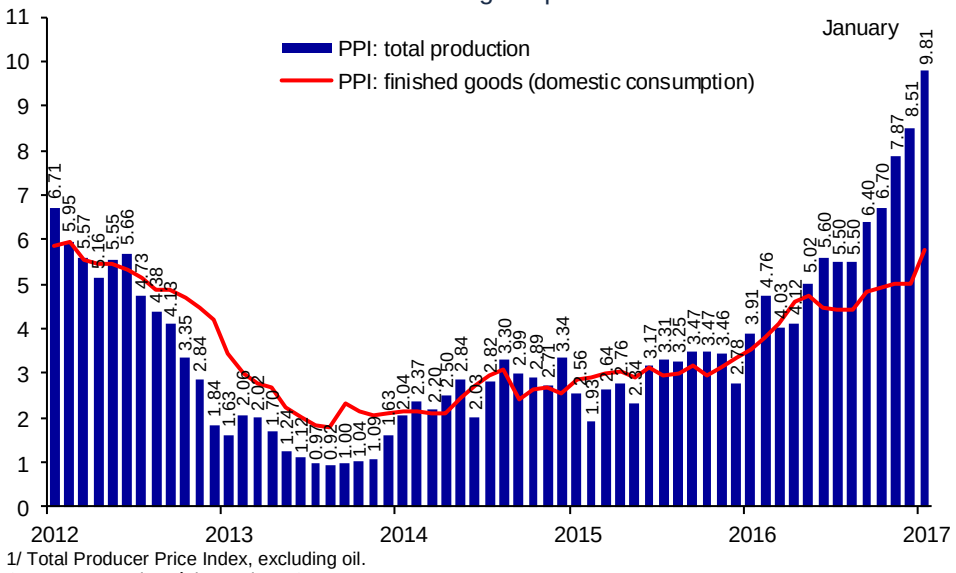
Gagnon, E. (2007). "Price Setting during Low and High Inflation: Evidence from Mexico" Board of Governors of the Federal Reserve System, International Finance Discussion Papers, No. 896.

Klenow, P. J. and Kryvtsov, O. (2008). "State-Dependent or Time-Dependent Pricing: Does it Matter for Recent U.S. Inflation?" *The Quarterly Journal of Economics*. Vol. 123, No. 3, pp. 863-904.

## 2.2. Producer Price Index

Between the third and the fourth quarters of 2016, the Producer Price Index (PPI) of total production, excluding oil registered an increment in its average annual change rate from 5.80 to 7.70 percent, marking 9.81 percent in January 2017 (Chart 7). Just like in three previous quarters of 2016, the PPI subindex that observed the highest annual change rates is that of the prices of merchandise destined to exports, which includes goods quoted in USD (10.96 and 13.31 percent in the third and the fourth quarters, while in January 2017 it was 15.21 percent). In contrast, the price subindex of finished goods and services for domestic consumption presented more moderate annual change rates (3.82 and 4.48 percent in the third and the fourth quarters of 2016, while in January 2017 it was 5.08 percent). It should be recalled that the producer price subindex with the highest predictive power of the performance of core merchandise consumer prices is that of finished merchandise for domestic consumption, while the price subindices of investment and exports' goods have less predictive power on the inflation of merchandise destined to consumers.[1]

**Chart 7**
**Producer Price Index** 1/
Annual change in percent




1/ Total Producer Price Index, excluding oil.
Source: Banco de México and INEGI.

[1] 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?".

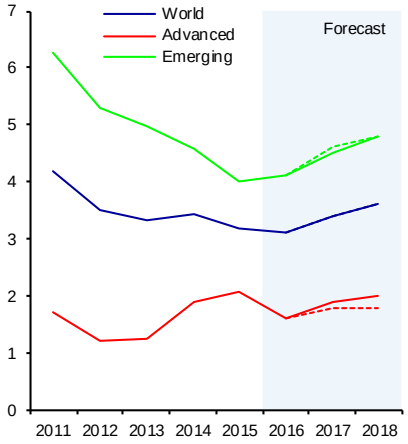
# 3. Economic and Financial Environment

## 3.1. External Conditions

During the fourth quarter of 2016, the global economic activity continued recovering. In this context, at the global level, trade presented signs of revival and inflation went up, in part, as a reflection of higher input prices. For 2017 and 2018, world economy is still expected to rebound moderately, partly derived from the expectation of expansionary fiscal policies in some of the main economies (Chart 8). Thus, the economic activity in the U.S. is anticipated to expand, in part due to the proposals contemplated by the new administration in terms of fiscal policies, via a higher spending on infrastructure and fiscal policy reforms, as well as the deregulation measures. In Europe, the dynamism of economic activity is expected to persist, despite important geopolitical risks. On the other hand, emerging economies are estimated to continue recovering, even though at a more moderate rate with respect to that previously expected. However, it should be noted that the expected expansion of the global economy is subject to different risks, among which those associated to a possible implementation of protectionist measures in various countries stand out. In particular, there is great uncertainty, among other factors, due to the possible features and the moment at which the fiscal, trade and migration policies could be implemented by the incoming U.S. administration. These policies could lead to lower trade and foreign direct investment at the global level, as well as to a considerable tightening of international financial conditions and a greater rate of the monetary policy normalization of the Federal Reserve.

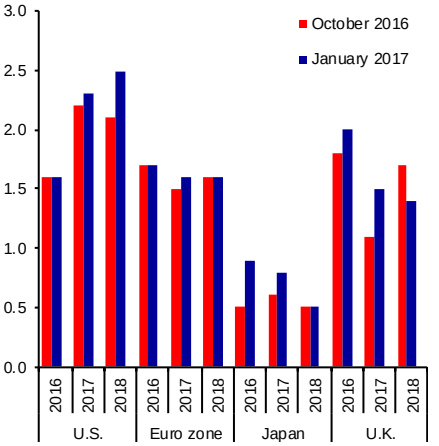
**Chart 8**
**World Economic Activity**

a) Growth Forecast for World GDP
Annual change in percent



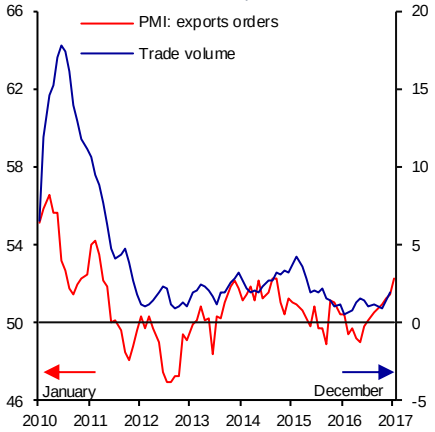

Note: The dotted lines refer to WEO forecasts of October 2016, the solid lines refer to WEO forecasts of January 2017.
Source: IMF, WEO October 2016 and January 2017.

b) GDP Growth Forecasts: Selected Advanced Economies
Annual change in percent




Source: IMF, WEO October 2016 and January 2017.

c) World Trade in Goods 1/ and Global Manufacturing PMI
Annual change of the 3-month moving average in percent and diffusion indices, s. a.




1/ It refers to the sum of exports and imports.
s. a. / Seasonally adjusted data.
Source: CPB Netherlands and Markit.

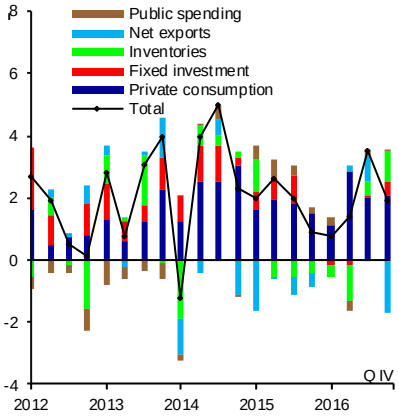
### 3.1.1. World Economic Activity

In the particular case of the U.S., during the fourth quarter of 2016, its economy continued expanding, presenting a growth of 1.9 percent at an annualized quarterly rate, following 3.5 percent in the third quarter (Chart 9a). Private consumption kept expanding at a high rate, indicating a favorable evolution of personal income and a better financial situation of households. Besides, fixed investment expanded for the third consecutive quarter, backed by a recovery of spending on equipment. In contrast, net exports negatively affected growth, given higher imports and lower exports, mainly agricultural exports, after a transitory rebound observed during the third quarter.

Meanwhile, the recovery rate of industrial activity moderated, on registering growth of 0.4 percent at an annualized quarterly rate in the fourth quarter (Chart 9b). On the one hand, production in the manufacturing and mining sectors increased at a greater rate than in the previous quarter, given the dynamism of the automotive sector and the recovery of activity in oil and gas exploration and extraction, respectively. The prospective indicators, such as the ISM Manufacturing Purchasing Managers' Index, point to a continuous recovery of activity in the manufacturing sector (Chart 9c). On the other hand, activities related to electricity and gas generation contracted, as a result of the negative impact of unusually high temperatures, observed mainly in November.

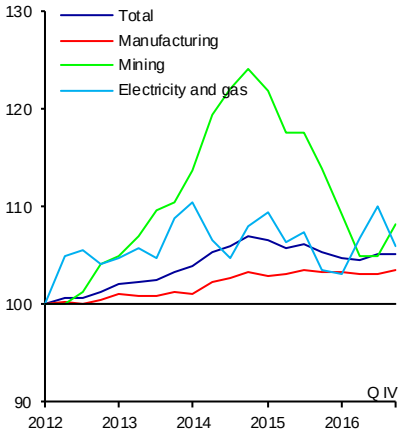
**Chart 9**
**U.S. Economic Activity**

a) Real GDP and Components
Annualized quarterly change in percent and percentage point contributions, s. a.



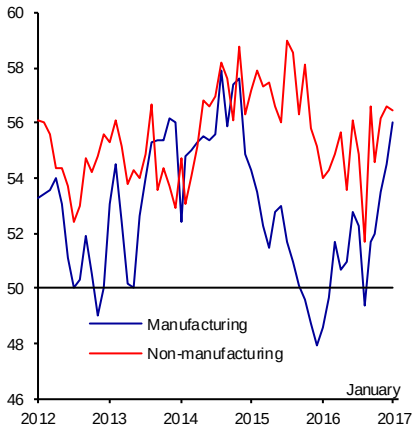

s. a. / Seasonally adjusted data.
Source: Bureau of Economic Analysis.

b) Industrial Production and Components
Index 1Q-2012=100, s. a.




s. a. / Seasonally adjusted data.
Source: Federal Reserve.

c) Purchasing Managers' Indices (ISM)
Diffusion indices, s. a.



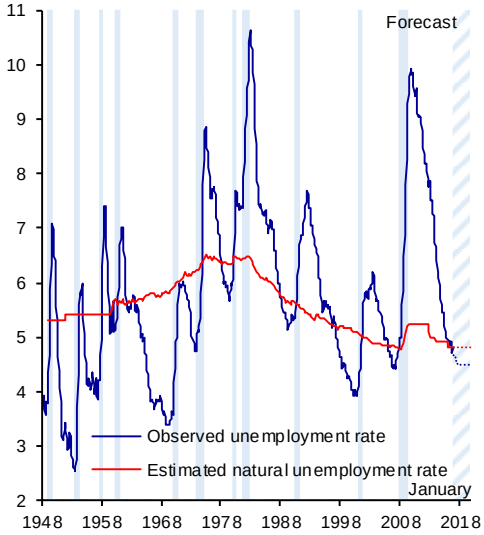

s. a. / Seasonally adjusted data.
Source: Haver Analytics.

In this environment, labor market conditions in the U.S. kept strengthening. Indeed, the job creation pace is still above the rate required to compensate for changes in the workforce. There was a shift from the monthly average rate of 200 thousand jobs between January and September 2016 to one of 168 thousand new jobs between October 2016 and January 2017 in non-farm payroll. Thus, the unemployment rate in January was 4.8 percent, which was close to the median of long-term unemployment rate estimates by the Federal Reserve (Chart 10a). In this context, there was a widespread (though moderate) increment in the wage growth rate. In particular, the growth rate of the average hourly pay and of the Employment Cost Index increased in the second half of the year with respect to that observed in the first semester (Chart 10b).

In the future, considerable risks to the sustained growth of the U.S. economy persist. Although the initial reaction of investors to the economic policy measures announced by the incoming U.S. administration seemed to be generally positive, there are important risks that the referred actions may negatively affect production and trade chains, the flows of foreign direct investment at the global level, along with the fiscal sustainability of this economy, in light of an estimated considerable increment in the public debt level. Furthermore, there is high uncertainty regarding the magnitude, the contents and the implementation date of the possible measures of fiscal stimulus and the effects that these will ultimately have onto the economy. Thus, the Federal Reserve will likely have to adjust its monetary policy in an environment in which it would be more difficult to anticipate the implications of the fiscal and monetary policies on the economic activity, employment and inflation.

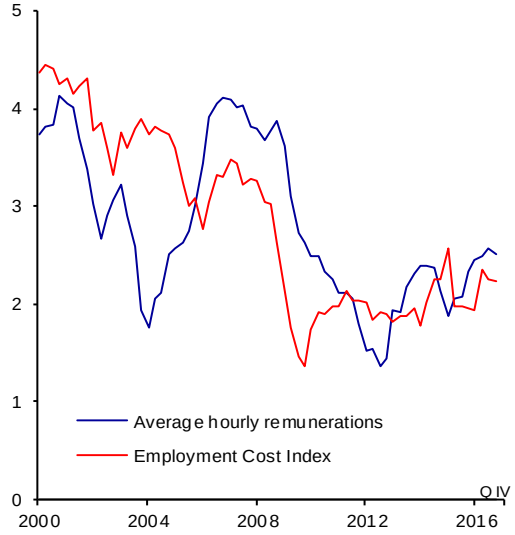
**Chart 10**
**U.S. Labor Market**

a) Observed Unemployment Rate and Estimated Natural Rate of Unemployment
In percent, s. a.




Note: Columns refer to recessions. The dotted lines refer to medians of the Federal Reserve long-term unemployment rate estimates (red) and estimates for the next three years (blue).
s. a. / Seasonally adjusted data. The observed unemployment rate corresponds to the 3-month moving average.
Source: BLS, CBO, Federal Reserve and the Federal Reserve Bank of Philadelphia.

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




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

In the Euro zone, GDP expanded at an annualized quarterly rate of 1.6 percent during the fourth quarter of the year, which was slightly below 1.8 percent observed in the previous quarter (Chart 11a and Chart 11b). This can be accounted for by the improvement in domestic demand, which was prompted by the positive trend of employment and by a certain increment in households' confidence levels. On the other hand, investment and industrial production moderately recovered, in view of favorable financial conditions in the region. However, the economic activity could still be affected by the process of the U.K. exit from the European Union, as well as by uncertainty over the stability of the Italian financial system and the results of the elections that are to take place across various countries, which could affect the political and economic landscape of the region. In the same vein, imbalances among the member states of the Euro zone kept accentuating, with a considerable trade surplus in Germany standing out.

## Box 2
## The Importance of Global Value Chains in Mexico and the U.S.

### 1. Introduction

The fragmentation of production via global value chains (GVCs) represents the most recent manifestation of the global economic integration. Previously, international trade, to a larger extent, focused on transactions of goods and services for final consumption. Still, processes of trade liberalization and progress in information and communication technologies significantly lowered transportation costs and, hence, favored the cross-border shipment of intermediate goods. Indeed, this has led to a greater use of differentials between costs of production among countries and has propitiated a fragmentation of the productive process at a global scale, in which different productive stages are located across different countries, based on their respective comparative advantages (Los et al., 2015; Antràs et al., 2012; Hummels, Ishii & Yi, 2001; Feenstra, 1998). Thus, GVCs have encouraged greater specialization, and, therefore, a more frequent use of resources as compared to a situation in which the entire productive process is carried out in one sole country. Thus, GVCs have positively affected productivity in the different countries they are located in, as well as their welfare levels (Olsen, 2006 and Amiti & Wei, 2009).

In this juncture, the Mexico – U.S. relation has gained particular relevance, given the geographic proximity and differentials in production costs that link these economies. This Box seeks to quantify the role of GVCs in the said countries, as well as the connection between them and with the rest of the world. Traditionally, literature has addressed productive relations among countries and value chains by means of foreign trade links (Johnson & Noguera, 2012; Koopman et al., 2008). Nonetheless, this analytical framework generally does not consider the economic relevance of productive links within a country. Additionally, the traditional approach does not take into consideration that, in a context of the global fragmentation of production, exports are characterized by a high proportion of imported goods, and, therefore, gross trade flows are no longer informative regarding the performance of the country as an exporting state or regarding profits from participating in the world trade. To overcome these limitations, it is necessary to make use of the sources of information that record not only trade flows, but also production, consumption and income flows across different sectors or industries, both within a country and among different states.

### 2. Follow-up and Decomposition of the Added Value Liked to GVCs, Using WIOD

To quantify the contribution of GVCs and of productive links across countries to the generation of added value in different nations, information available in the world input-output database (WIOD) is used.[1] The principal elements in the construction of a WIOD are the data contained in the national input-output matrices and bilateral trade flows.[2]

To quantify the added value generated by the global demand of the Mexican and U.S. manufactures, we use the methodology developed by Leontief (1936) as a basis. Intuitively, the value of production is defined as the sum of the required intermediate inputs plus the production for final consumption. Formally, it is presented as:

$$\boldsymbol{x} = \boldsymbol{A}\boldsymbol{x} + \mathbf{c} \qquad (1)$$

Where,

$\mathbf{c}$: Is a vector (n x 1) that contains the production of each sector/country n destined for final consumption.

$\boldsymbol{A}$: Is the matrix (n x n) of technical requirements to produce a unit of production.

$\boldsymbol{x}$: Is a vector of production (n x 1) that contains total production of each sector/country n.

$$\begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} = \begin{bmatrix} a_{1,1} & \cdots & a_{1,n} \\ a_{2,1} & & a_{2,n} \\ \vdots & \ddots & \vdots \\ a_{n,1} & \cdots & a_{n,n} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} + \begin{bmatrix} c_1 \\ c_2 \\ \vdots \\ c_n \end{bmatrix} \qquad (2)$$

Reordering the terms in (1), we obtain:

$$\boldsymbol{x} = \boldsymbol{B}\boldsymbol{c} \qquad (3)$$

Where $\boldsymbol{B} = (\boldsymbol{I} - \boldsymbol{A})^{-1}$ is Leontief's matrix that allows to obtain total necessary production of each industry/country contained in vector $\boldsymbol{x}$ to produce final goods included in vector $\mathbf{c}$. This estimate can be extended

[1] The World Input-Output Database (WIOD) was developed by 11 European academic institutions and was funded by the European Commission. It contains information on productive relations among 41 countries (including an aggregate for the rest of the world), each one with 35 sectors of economic activity. The data are available for the period from 1995 to 2011, at an annual frequency.

[2] The WIOD has been used in numerous studies as a tool to quantify countries or industries' contributions to different productive chains. For example, Timmer et al. (2015) and Baldwin & Lopez-Gonzalez (2015) describe trends in GVCs and analyze the formation of regional production clusters. Wang et al. (2013) use this database to allocate the contents of the domestic aggregate value to exports of different countries and sectors.

to obtain the generation of added value (AV) associated to this production.

Where:

$$\mathbf{VA} = \boldsymbol{V}(\boldsymbol{I} - \boldsymbol{A})^{-1}\boldsymbol{c} \qquad (4)$$

***V***: Is a diagonal matrix (*n* x *n*) with the ratios of added value to production of each industry/country *1,…,n*.

Traditionally, the input-output analysis has been used to decompose different sectors/countries' contribution to the production of a given good. This Box seeks to analyze two aspects in particular: 1) the importance of GVCs for the added value of a country, and 2) the importance of a country's AV in a GVC.

### 3. The Importance of GVCs in the Mexican and U.S. Economies

To quantify the importance of GVCs in a particular economy, we follow a methodology similar to that of Wang et al. (2015). Note that the production of country *s* ($\boldsymbol{x}^s$) can be decomposed in the following manner:

$$\boldsymbol{x}^s = \boldsymbol{A}^{ss}\boldsymbol{x}^s + \sum_{r \neq s}^{M} \boldsymbol{A}^{sr}\boldsymbol{x}^r + \mathbf{c}^{ss} + \sum_{r \neq s}^{M} \boldsymbol{c}^{sr} \qquad (5)$$

Where *M* is the number of countries and the superscripts denote sub blocks within the considered matrices/vectors. Thus, for example $\boldsymbol{A}^{sr}$ refers to the sub block of matrix ***A*** which represents the required inputs to country *s* for the production of a unit of production of country *r*. In the same line, $\boldsymbol{c}^{sr}$ corresponds to the production of country *s* destined for final consumption in country *r*. By reordering the terms and using again the diagonal matrix of the added value, we can decompose the added value of country *s* in the following way:

$$\boldsymbol{VA^s} = \boldsymbol{V}^s\boldsymbol{x}^s = \boldsymbol{V}^s\boldsymbol{L}^{ss}\boldsymbol{c}^{ss} + \boldsymbol{V}^s\boldsymbol{L}^{ss}\sum_{r \neq s}^{M} \boldsymbol{c}^{sr} + \boldsymbol{V}^s\boldsymbol{L}^{ss}\sum_{r \neq s}^{M} \boldsymbol{A}^{sr}\boldsymbol{x}^r \qquad (6)$$

Where $\boldsymbol{L}^{ss} = (\boldsymbol{I} - \boldsymbol{A}^{ss})^{-1}$. After further modifications, this equation can be decomposed in the following manner:

$$\boldsymbol{VA}^s = \underbrace{\boldsymbol{V}^s\boldsymbol{L}^{ss}\boldsymbol{c}^{ss}}_{\text{DVA1}} + \underbrace{\boldsymbol{V}^s\boldsymbol{L}^{ss}\sum_{r \neq s}^{M} \boldsymbol{c}^{sr}}_{\text{DVA2}} + \underbrace{\boldsymbol{V}^s\boldsymbol{L}^{ss}\sum_{r \neq s}^{M} \boldsymbol{A}^{sr}\sum_{u}^{M} \boldsymbol{B}^{ru}\sum_{t}^{M} \boldsymbol{c}^{ut}}_{\text{GVCs}} \qquad (7)$$

Thus, the decomposition of the added value generated in country *s* consists of three terms:

DVA1: Represents the added value generated to produce final goods for domestic consumption.

DVA2: Represents the added value generated to produce final goods for exports consumed by each trade partner *r*.

GVCs: Represents the added value generated to produce intermediate goods used by each trade partner *r,* either for production of final goods or for their re-exporting (as intermediate or final goods) to third countries, including the initial exporter *s*.

Thus, the latter term covers a broad range of trade relations and captures the complex nature of GVCs. As will be shown below, this term has gained more importance in the Mexican and the U.S. economies and plays a relevant role in the manufacturing sectors of both countries.

Chart 1a shows the decomposition of Mexico's added value, in which slightly over 20 percent are linked to the export activity. Of this figure, approximately 13 percent are related to GVCs; that is, it is the added value that will be used in shared productive processes. The remaining 7 percent refer to the added value generated for the exports of final goods. The importance of the external sector increases in the case of the manufacturing industry, in which around 43 percent of the generated added value is related to the external sector and slightly more than 20 percent fall within GVCs. This participation is highly variable across different manufacturing sectors. For example:

i. In the electric equipment sector, almost 90 percent of the added value generated in Mexico are related to the external sector, where approximately a half falls within GVCs.

ii. Likewise, the transport equipment sector is closely linked to the external sector, with approximately 80 percent of its added value destined to the external sector. This includes 30 percent of AV oriented to GVCs.

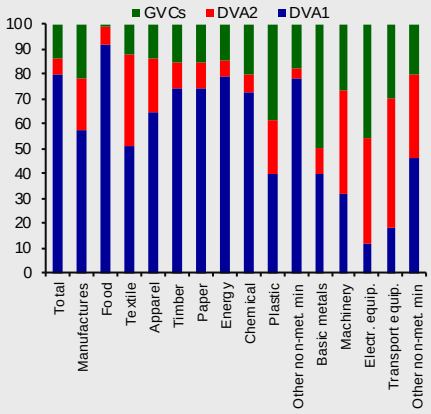
iii. In contrast, other sectors, such as the chemical one, present a lower degree of orientation to the external sector, with 28 percent of their AV oriented to this sector, and 20 percent destined to GVCs.

The importance of GVCs in the generation of AV in Mexico has been increasing over the last two decades (Chart 1b). Besides, as shown in Chart 1c, the incorporation of Mexico into GVCs largely takes place via its trade with the U.S. In conclusion, the Mexican economy, and in particular its manufacturing sector are deeply integrated into GVCs, which strongly contribute to the generation of profits in the country.

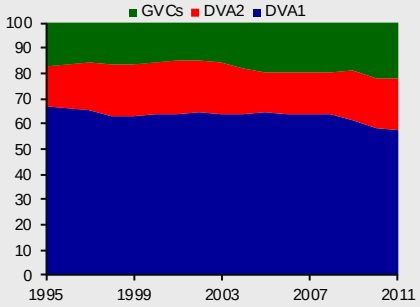
Chart 2a shows the same decomposition for the case of the U.S. economy. It can be observed that, although the importance of the external sector is relatively lower for the economy as a whole, it is not the case for the manufacturing sector. In the latter, over 30 percent of the generated AV are linked to the external sector and almost 20 percent are integrated in GVCs. Furthermore, in the case of the U.S. the importance of the external sector is principally determined by its participation in GVCs, rather than as an exporter of final goods. This suggests that the productive process of manufactures in the U.S. managed to significantly benefit from the efficiency gains that are traditionally liked to GVCs. Likewise, in some sectors, the importance of GVCs is even greater, for example in the case of electric equipment and basic metals. Chart 2b also shows a growing relevance of the manufacturing AV linked to GVCs in the case of the U.S. and a relatively stable importance of its role as an exporter of final goods. Chart 2c shows the importance of different trade partners for the integration of the U.S. manufacturing sector in GVCs. Unlike Mexico, which indicates a high concentration of a sole trade partner, the U.S. present a more balanced pattern, in which Canada, Mexico and China are notable. In the case of the latter two countries, a greater relevance of U.S. exports of intermediate goods is observed, to be used in GVCs, as compared to those for final consumption.

**Chart 1**
**Decomposition of the Mexico's Added Value, by Destination** 1/

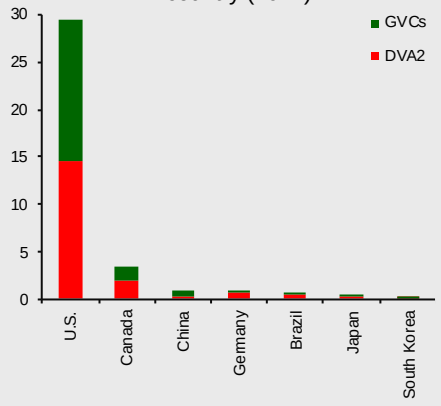
a) Decomposition of added value, by sector (2011)




b) Evolution of the composition of the manufacturing added value, by destination



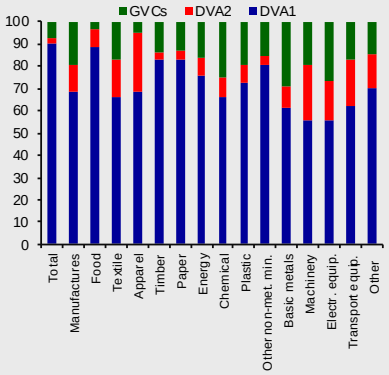

c) Decomposition of the manufacturing AV liked to the external sector, by importing country (2011)



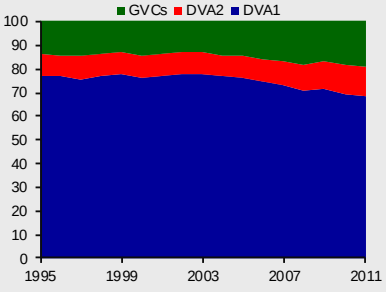

1/ It refers to terms DVA1, DVA2 and GVCs from equation (7).
Source: Prepared by Banco de México with data from the World Input-Output Database.

**Chart 2**
**Decomposition of the U.S. Added Value, by Destination** 1/

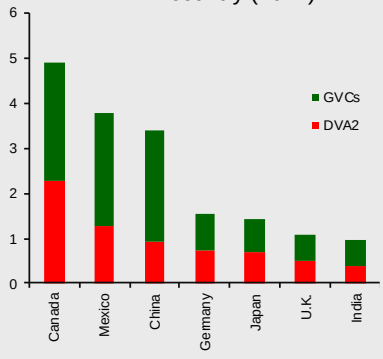
a) Decomposition of added value, by sector (2011)




b) Evolution of the composition of the manufacturing added value, by destination




c) Decomposition of the manufacturing AV liked to the external sector, by importing country (2011)

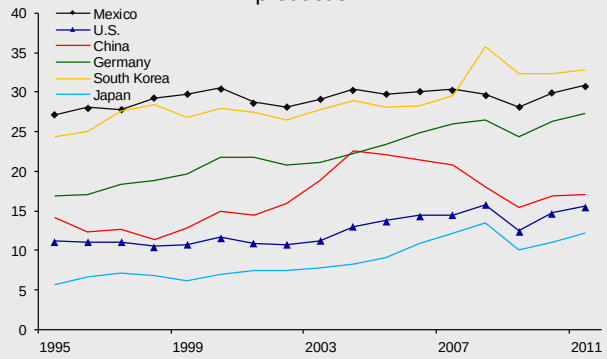



1/ It refers to terms DVA1, DVA2 and GVCs from equation (7).
Source: Prepared by Banco de México with data from the World Input-Output Database.

## 4. Change in the Composition of GVCs

The previous section quantifies the composition of the manufacturing AV generated within a country and the importance of its incorporation within GVCs. This section seeks to analyze the composition of different GVCs and the importance of different countries within them. Rather than a detailed analysis of the weight of different economies within GVCs, this section analyzes the evolution of foreign added value in manufacturing GVCs in a sample of economies. As stated above, as a result of lower transport costs in trade and the fast progress in information and communication technologies, productive chains become increasingly fragmented, placing different production stages across different countries. This has favored the increment in the added value generated abroad within the given productive chains, a tendency that has been widespread across different productive processes and countries. As shown in Chart 3, the foreign component of AV has been increasing across almost all analyzed countries throughout recent decades and it is not a phenomenon peculiar to a particular country.

**Chart 3**
**Foreign Contribution to the Manufacturing Production**
Foreign added value as a percentage of manufacturing production




Source: Prepared by Banco de México with data from the World Input-Output Database.

## 5. Conclusions

Currently, there is great uncertainty over the possible implementation of protectionist measures at the global level. A higher incidence and the relevance that GVCs have gained implies stronger impacts generated by these measures. In particular, in a context of greater importance of GVCs, if a country imposes restrictions on its international trade, not only does it affect the country of origin of imported goods, but, in addition, it also loses competitiveness due to the impossibility to have access to inputs at competitive costs. Furthermore, in view of the fact that these chains contain components of different origins, a country's trade policy has broader indirect effects, affecting a wider number of economies. Additionally, the complex nature of international productive links implies that imposing restrictions to trade could generate even more adverse effects than those that could be observed if the trade was only restricted to final goods and services, given that not only it distorts the patterns of consumption and trade, but also increases the costs affecting the international organization of the productive process. In this context, the distortions to trade are accumulated throughout the stages of the chains, when intermediate inputs cross the borders a number of times during the whole process.

In conclusion, it can be observed that the participation in GVCs has been established as an important factor in the economies of North America, particularly in the manufacturing sector. Thus, in view of uncertainty over the possible distortions and restrictions to the orderly functioning of these chains, that are possibly generated by strong adverse impacts across all economies conforming this block, Mexico should continue boosting its competitiveness in the international arena. Considering the high concentration of the national AV that participates in GVCs via the country's trade with the U.S., it is mandatory to maintain the country's openness, seeking greater diversification of exports' destination markets and of origin markets of imports.

## References

Amiti, M., & Wei S. (2009). "Service Offshoring and Productivity: Evidence from the United States". The World Economy 32(2), 203–220.

Antràs, P., Chor, D., Fally, T., & Hillberry, R. (2012). "Measuring the Upstreamness of Production and Trade Flows". The American Economic Review, 102(3), 412-416.

Baldwin, R., & Lopez-Gonzalez, J. (2015). "Supply-chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses". The World Economy, 38(11), 1682-1721.

Feenstra, R. (1998). "Integration of Trade and Disintegration of Production in the Global Economy". The Journal of Economic Perspectives, 12 (4), 31-50.

Hummels, D., Ishii, J., & Yi, K. M. (2001). "The Nature and Growth of Vertical Specialization in World Trade". Journal of International Economics, 54 (1), 75-96.

Johnson, R. C., & Noguera, G. (2012). "Accounting for intermediates: Production sharing and trade in value added". Journal of International Economics, 86(2), 224-236.

Koopman, R., Wang, Z., & Wei, S. (2008). "How Much of Chinese Exports is Really Made In China? Assessing Domestic Value-Added When Processing Trade is Pervasive". National Bureau of Economic Research Working Paper No. 14109.

Leontief, W. (1936). “Quantitative Input-Output Relations in the Economic System of the United States”. Review of Economics and Statistics, 18(3), 105-25.

Los, B., Timmer, M. P., & Vries, G. J. (2015). “How global are global value chains? A new approach to measure international fragmentation”. Journal of Regional Science, 55(1), 66-92.

Olsen, Karsten Bjerring (2006). “Productivity Impacts of Offshoring and Outsourcing: A Review”.

Timmer, M. P., Dietzenbacher, E., Los, B., Stehrer, R. & de Vries, G. J. (2015). “An Illustrated User Guide to the World Input–Output Database: the Case of Global Automotive Production”. Review of International Economics, 23: 575–605.

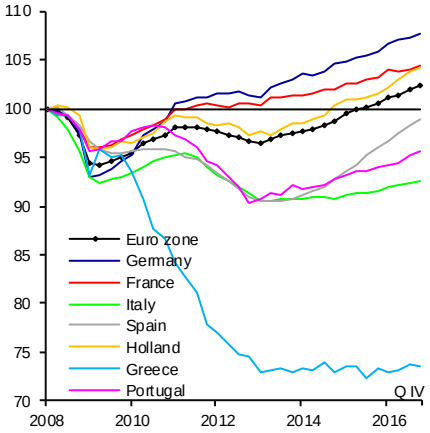
Wang, Z., Wei, S., & Zhu, K. (2013). “Quantifying international production sharing at the bilateral and sector levels”. National Bureau of Economic Research, Working Paper No. 19677.

Wang, Z., Wei, S., Zhu, X. (2015). “Characterizing Global and Regional Value Chains”.

In the U.K., during the fourth quarter of 2016 economic activity expanded 2.9 percent at an annualized quarterly rate, which exceeded the 2.3 percent observed over the previous two quarters (Chart 11c). The dynamism of the economy remained supported by the growth in domestic consumption and by the expansion in the services. However, even though the prospective indicators, such as the Business Optimism Index, point to an uptick in investment and industrial production, the sustained recovery will depend on the negotiations of the U.K. withdrawal from the European Union.

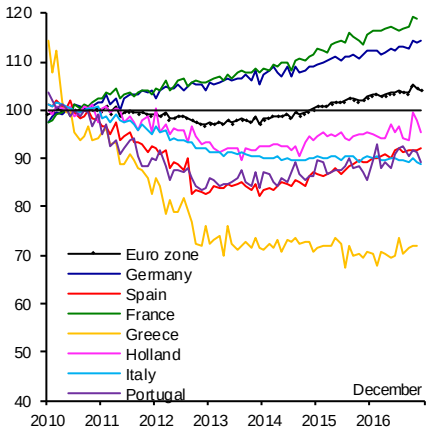
**Chart 11**
**Economic Activity in the Euro Area and the U.K.**

a) Euro Area: Real GDP
Index 1Q-08=100, s. a.



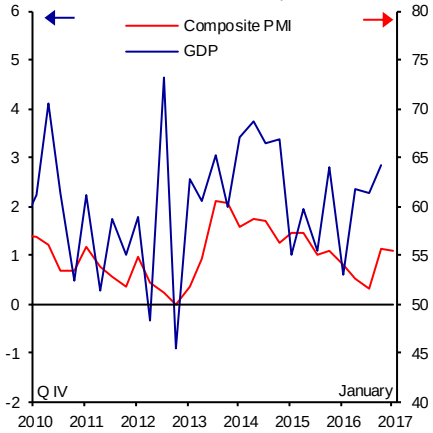

s. a. / Seasonally adjusted data.
Source: Eurostat.

b) Euro Area: Retail Sales
Index 2010=100, s. a.




s. a. / Seasonally adjusted data.
Source: Haver Analytics.

c) U.K.: GDP and Purchasing Managers' Index (PMI)
Annualized quarterly change and diffusion index, s. a.



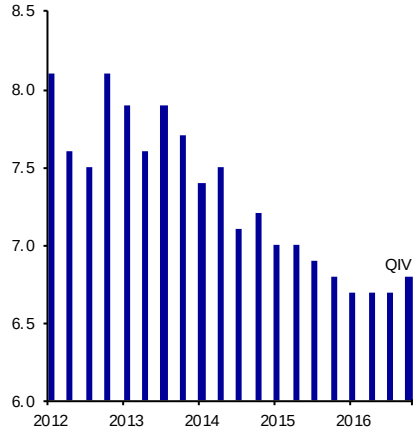

s. a. / Seasonally adjusted data.
Source: Office for National Statistics and Markit.

During the last quarter of 2016 the economy of Japan continued recovering, and expanded at an annualized quarterly rate of 1.0 percent. This result was largely supported by a rebound in exports and by a recovery of investment in businesses. On the other hand, industrial production expanded considerably in light of a greater external demand. Although corporate profits have increased due to improved terms of trade, the weakness of the Japanese yen and low interest rates, in the future the pace of the recovery will depend on the fact if the positive trend persists in consumers' and businesses' confidence, which, despite an improvement, still indicates caution.

In the fourth quarter of 2016, the performance of emerging economies varied across regions and countries (Chart 12). On the one hand, most Asian economies gradually reactivated, supported by the greater-than-expected growth in China and a rebound in input prices. As of the fourth quarter of 2016, GDP in that country expanded at an annual rate of 6.8 percent, which was slightly higher than in the previous one, and which was prompted, in part, by an expansionary fiscal policy. In the future, the economic activity is expected to decelerate moderately, due to the elimination of some stimuli in the housing and automotive sectors, and due to the implementation of measures to contain capital outflows and to lower financial risks. Nevertheless, there is still a risk of a stronger-than-estimated deceleration of the Chinese economy. If this risk materializes, it would carry implications for other emerging economies, manifested through lower input prices and a possibly higher volatility in international financial markets. On the other hand, economic activity in Latin America has weakened, as a result of the tightening of global financial conditions. Thus, the balance of risks to the growth in this group of economies has deteriorated.

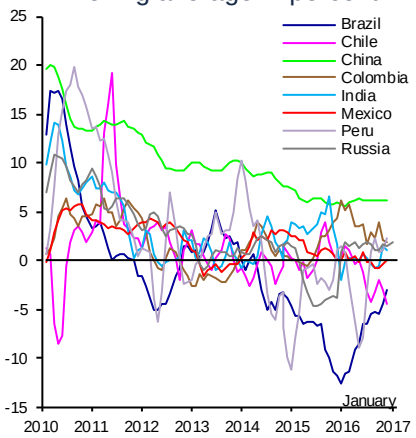
**Chart 12**
**Economic Indicators of Emerging Economies**

a) China: Gross Domestic Product
Annual change in percent



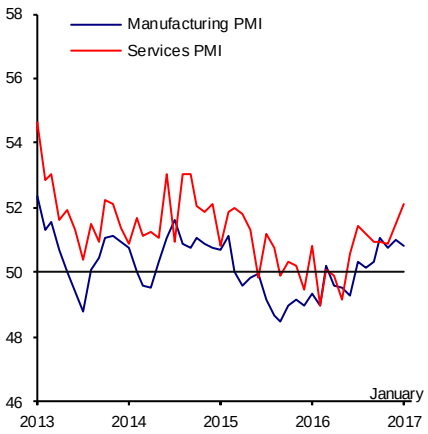

Source: Haver Analytics.

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




Source: Haver Analytics.

c) Emerging Economies: Purchasing Managers' Index (PMI)
Diffusion index, s. a.



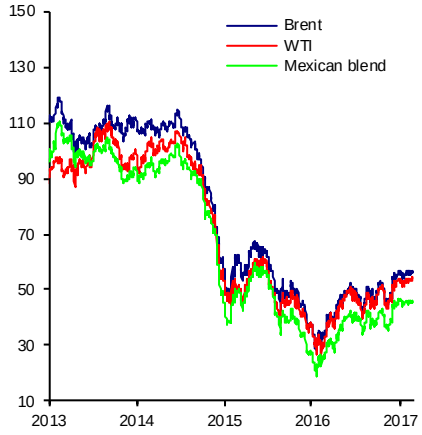

s. a. / Seasonally adjusted data.
Source: Markit.

### 3.1.2. Commodity Prices

International commodity prices moderately recovered in the period analyzed by this Report (Chart 13). Oil prices went up, as a result of the agreement reached in late November among the OPEC countries and other states, the goal of which was to set a production ceiling. In the same vein, industrial metal prices rebounded, given a better outlook for the economy of China and the expectation that the incoming U.S. administration would boost demand, by encouraging spending on infrastructure. Finally, grain prices increased slightly, even though they remain close to the minimum levels over the period of the last 6 years, given the persistence of high production forecasts, which could lead to a continuous accumulation of inventories.

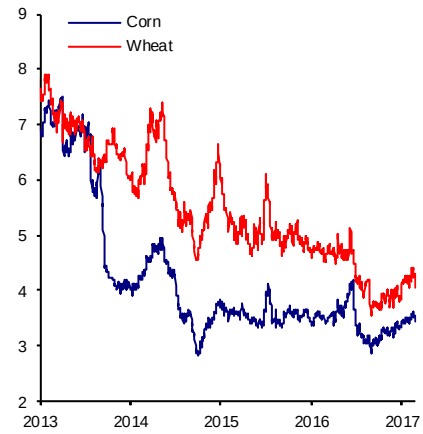
**Chart 13**
**International Commodity Prices [1/]**

a) Crude Oil
USD/barrel



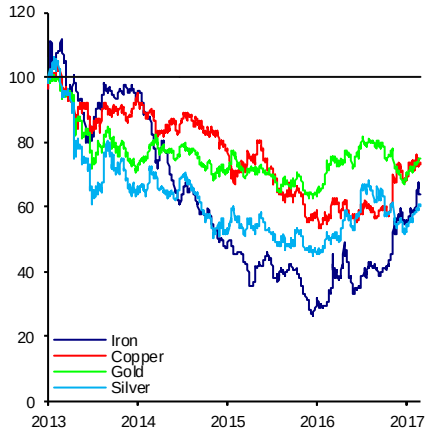

1/ Spot Market.
Source: Bloomberg.

b) Corn and Wheat
USD/bushel




Source: Bloomberg.

c) Metals
Index 01/01/2013=100




Source: Bloomberg.

### 3.1.3. Inflation Trends Abroad

Headline inflation and its expectations in most advanced economies maintained an upward trend in the fourth quarter. However, in many of these economies, inflation is still below the targets of the respective central banks (Chart 14a and Chart 14b).

i. In the U.S., the consumption deflator lied at 1.6 percent in December, which was still below the Federal Reserve target, after persisting around 1 percent during the third quarter. This was due to both the fading of the negative impact generated by energy and imports prices onto prices, and a lower degree of slack conditions in the resource utilization of the economy. Nevertheless, core inflation remained unchanged at 1.7 percent.

ii. In the Euro area, inflation kept growing during the reference period, observing an annual rate of 1.8 percent in January 2017, still below the European Central Bank's target (ECB) of a figure below but close to 2 percent in the medium term, supported by the recovery of input prices. On the other hand, even though core inflation rebounded slightly and marked 0.9 percent in January, it still points to the presence of slack conditions in the labor market in the region. It is noteworthy that the performance of prices varied among the main economies, exhibiting a higher inflation in Germany, while in some economies at the periphery the price growth is still low.

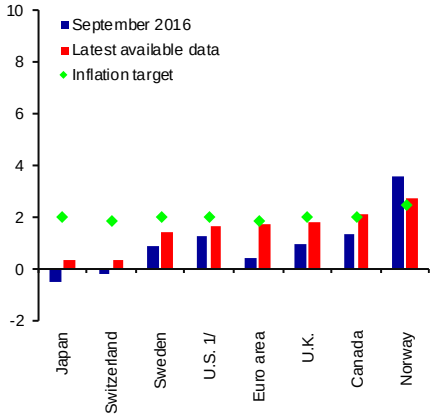
iii. In the U.K., consumer inflation maintained its upward trend, locating at an annual rate of 1.8 percent in January 2017, in part reflecting the impact of the recent depreciation of the pound sterling and the relative strength of demand. In accordance with the Bank of England's forecast, inflation will likely continue growing until the first half of 2018 and will even remain above its inflation target of 2 percent during the forecast horizon, which covers the period up until the first quarter of 2020.

iv. In Japan, inflation resumed its positive trend, marking an annual rate of 0.3 percent in December 2016. This result reflects higher energy prices and the weakness of the Japanese yen. However, the indicator that excludes food and energy items has maintained its downward trend since early 2016, and inflation expectations are far below the Bank of Japan's target.

In emerging economies, the performance of inflation has varied across countries and regions (Chart 14c). In general, inflation in Latin America went down, once the effects of the previous depreciation of their exchange rates faded. In Asia, inflation increased in most countries during the period covered by this Report, as a result of a lower slack in their economies and the recovery of their input prices, even though it is still at low levels. Meanwhile, in the countries of North Africa, of the Middle East and emerging Europe, such as Egypt and Turkey, inflation pressures were observed, in the wake of greater geopolitical and economic risks.

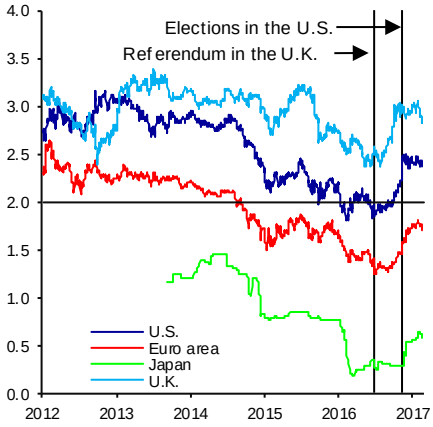
**Chart 14**
**Annual Headline Inflation and Inflation Expectations in Advanced and Emerging Economies**
Percent

a) Advanced Economies: Headline Inflation



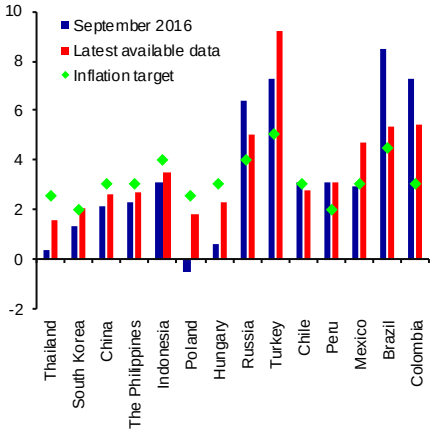

1/ It refers to consumption deflator. Seasonally adjusted data.
Source: Haver Analytics.

b) Advanced Economies: Long-term Inflation Expectations Derived from Financial Instruments 1/




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: J.P. Morgan.

c) Emerging Economies: Headline Inflation




Source: Haver Analytics.

### 3.1.4. International Fiscal and Monetary Policy, and Financial Markets

The estimated increment in the growth rate of the world economic activity is supported by the expected higher fiscal impulse in the main economies. In particular, the new administration of the U.S. is anticipated to adopt an expansionist fiscal policy, based on greater expenditure on infrastructure and on reforms to the fiscal policy, although there are still no formal proposals in this regard. On the other hand, Canada and Japan announced plans of a higher spending on infrastructure in the medium term, whereas the U.K. abandoned its pursuit to eliminate its fiscal deficit in 2020. Fiscal expansion is also anticipated in the Euro zone as a whole, for this year and the following one. Among emerging economies, during 2017 the government of China is expected to continue with a fiscal policy that boosts its economic growth.

In this context, and given the increment in inflation, the outlook for the monetary policy has been modified in various countries. Particularly, in the U.S. the rate of the monetary policy normalization could be faster than estimated prior to the Federal Reserve meeting in December. Also, in some cases, such as in the Euro area and Japan, a decrease in deflation risks is perceived, and, therefore, the current environment may lead to less accommodative monetary policies.

i. In the U.S., in its meeting of February 2017, the Federal Reserve maintained the target range of its federal funds' rate between 0.50 and 0.75 percent, following a 25-basis-point increment in December 2016. Furthermore, it confirmed its stance that the most appropriate strategy to reach its 2 percent inflation target and to attain full employment is still by gradually increasing its reference rate. It should be noted that the

expected trajectory of the federal funds' rate reflects a monetary normalization rate that is faster than previously anticipated, in part due to the expectation of a considerable fiscal expansion. Given the possibility of this scenario, various members of the Open Market Committee emphasized the macroeconomic risks of maintaining an unemployment rate below the natural rate for a prolonged time period, which could require a greater tightening of monetary conditions. On the other hand, in its subsequent meetings, the Federal Reserve will assess the economic conditions that may prompt adjustments in its balance regarding its size and composition. In this respect, it has been stated that the said adjustment will start once the normalization process of the federal funds' rate is advanced and is carried out in a gradual and orderly fashion.

ii. In its meeting of January, the European Central Bank (ECB) did not modify its reference rates and confirmed its commitment to maintaining an accommodative stance as long as inflation does not exhibit a sustained convergence to its target. It should be pointed out that in its previous meeting in December 2016, the ECB extended its asset purchase program for another nine months until December 2017, even though it reduced its asset purchasing pace from a monthly amount of EUR 80 to 60 billion, and some modifications were realized in the features of the assets that can be purchased. In the Minutes of this meeting, the said Institution highlighted that these modifications were perceived as a measure to lower pressures on liquidity of the market and to guarantee a more robust implementation of the program, while maintaining a sufficient degree of flexibility to adjust the amount of the purchases if necessary. Despite lower deflationary pressures in the Euro area, the ECB identified the challenges it faces derived from the differences in inflation rates across a number of countries of the region.

iii. In its meeting of February, the Bank of England maintained its monetary stance unchanged. The institution acknowledged that the recent depreciation of the pound sterling and its pass-through onto consumer prices will imply an inflation higher than its target, but it has reiterated that inflation above the target will be tolerated for a while in view of the dilemma it faces between the speed at which it is expected to converge to the inflation target and the support that the monetary policy must provide to the economic activity and job creation. On the other hand, the central bank increased its growth forecast for the next years and lowered its estimate of the natural rate of unemployment. In this juncture, despite a low need of additional stimuli with respect to the previous estimate, the Monetary Policy Committee will wait until it has greater clarity regarding the effects of the U.K. exit from the European Union, stressing that the monetary policy could act in any direction, as applicable.

iv. In its meeting in late January, the Bank of Japan maintained unchanged its asset buying program at the amount of JPY 80 trillion a year and its guide to manage the yield curve, with the deposit rate at -0.1 percent and the 10-year government rate around 0 percent. This institution adjusted its forecast for the economic activity for the next years upwards, but maintained its expectation to attain its inflation target in 2018. However, the central bank stated that the risks to the growth outlook and inflation are still downward.

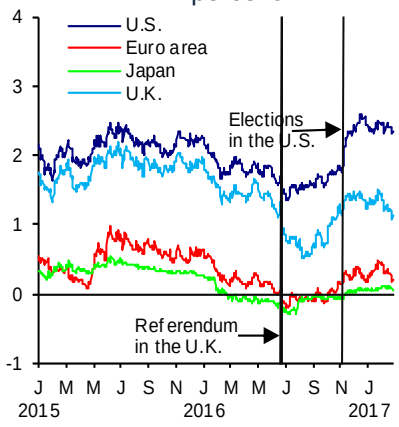
v. The improved inflation outlook in emerging economies prompted the monetary stance to generally remain unchanged and in some cases to even relax. This is despite the fact that inflation in different countries still persists above their respective targets. On the other hand, some countries, such as Egypt and Turkey had to increase their reference rate in view of higher inflation risks derived from the depreciation of their exchange rates, as a result of greater geopolitical risks.

As regards international financial markets, over the last months of 2016 investment portfolios were significantly readjusted and global financial conditions tightened, prompted by the expectation of possible fiscal stimuli in the U.S. This process accentuated after the Federal Reserve estimated a faster rate of the monetary policy normalization in its meeting of December 2016. This was reflected in higher long-term interest rates and in an appreciation of the U.S. dollar with respect to a broad basket of currencies (Chart 15). Thus, the exchange rates of emerging economies' currencies generally depreciated against the U.S. dollar (Chart 16). Despite significant capital outflows, the reactions in the stock and debt markets in the said economies, in general, were moderate. In contrast, in 2017 there has been greater stability in international financial markets, and even in some cases adjustments related to the outcome of the U.S. elections reverted. Thus, the U.S. dollar reverted part of its appreciation against most currencies of advanced economies, possibly as a reflection of the lack of consensus regarding the economic measures to be implemented by the new administration of the U.S. Stock market indices kept registering almost widespread profits, in light of a better outlook for the economic growth in the main developed countries, particularly in the U.S., despite the adjustment registered over the last weeks. In emerging economies, in foreign exchange markets, stock markets and bond markets there was a reversal in the negative trends initially observed, and even more timely data exhibit moderate capital inflows to this group of countries.

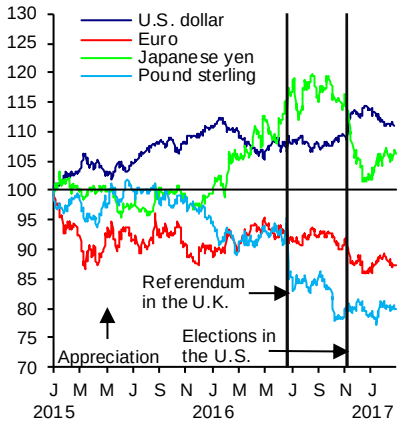
In the future, different factors of risk persist, which could lead to new episodes of volatility in international financial markets. Among these factors of risk are the effects of some of the measures that the incoming administration of the U.S., along with other countries, may introduce, and their implications for the world economy, as well as the normalization of the monetary policy by the Federal Reserve. Indeed, optimism perceived in financial markets in recent days partly reflects the expectation of the policies of fiscal expansion and deregulation measures in the U.S. However, protectionist policies, that may strongly affect international trade and may worsen the relation among the main economies, could adversely affect global growth. Furthermore, the exit of the U.K. from the European Union, along with the strengthening of the forces in the continent seeking withdrawal of other European countries from this Union, could affect the evolution of the economic activity and financial markets in the region. Finally, vulnerabilities of the financial sector and uncertainty over the sustainability of the economic growth in China are also factors of risks to the global economy during 2017.

## Chart 15
## Financial Indicators in Selected Advanced Economies

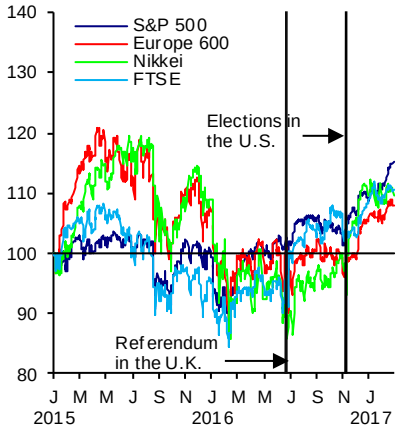
a) 10-Year Bond Yield
In percent




b) Exchange Rate
Index 01/01/2015=100



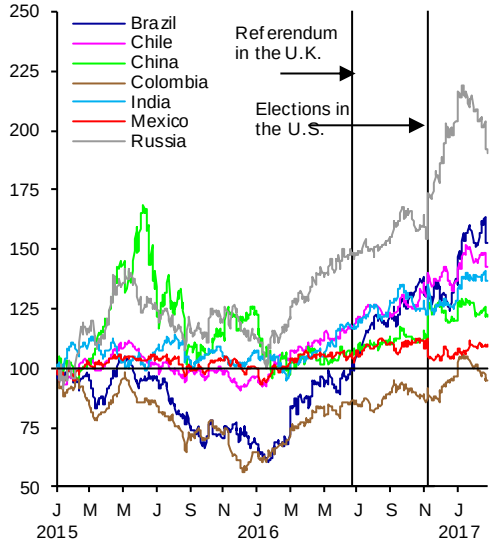

c) Stock Markets
Index 01/01/2015=100



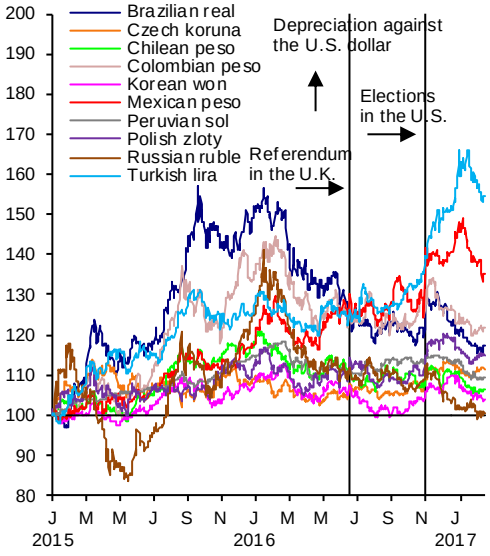

Source: Bloomberg.

## Chart 16
## Financial Indicators of Emerging Economies

a) Stock Markets
Index 01/01/2015=100

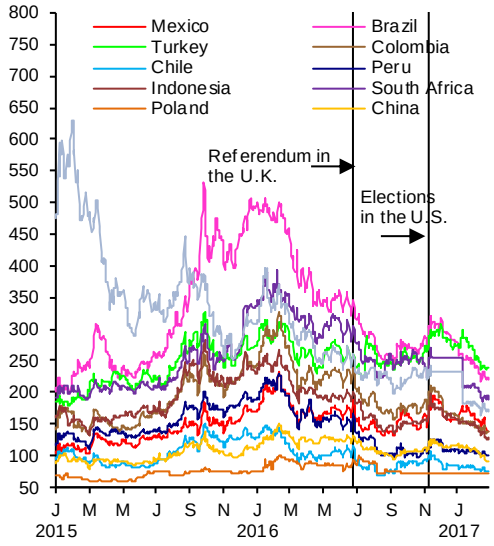



b) Exchange Rate
Index 01/01/2015=100



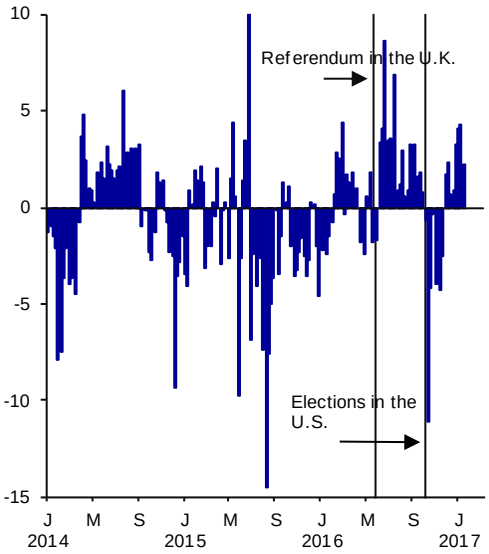

Source: Bloomberg.

c) Sovereign Credit Risk Market Indicators (CDS)
In basis points




Source: Bloomberg.

d) Weekly Flows of Funds to Emerging Economies (Debt and Stock) 1/
In USD billion




1/ The sample includes funds used for emerging economies' stock and bond transactions, registered in advanced economies. The flows exclude the performance of the portfolio and the exchange rate movements.
Source: Emerging Portfolio Fund Research.

## 3.2. Evolution of the Mexican Economy

### 3.2.1. Economic Activity

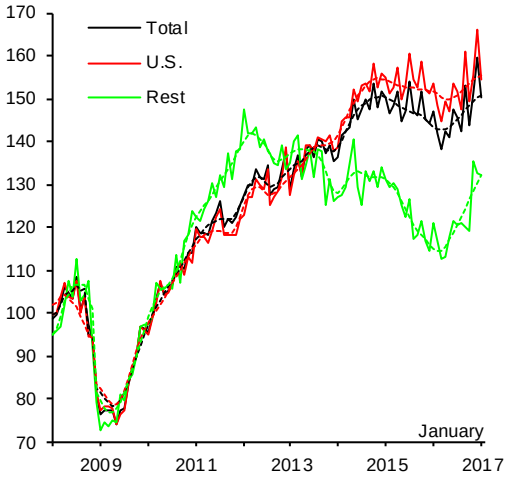
In the last quarter of 2016, the Mexican economy kept expanding, although at a lower growth rate than in the third quarter. In particular, external demand continued to improve, while private consumption preserved its positive trajectory. In contrast, the performance of investment remained weak.

Specifically, in the reference quarter and in the first month of 2017, as a result of the depreciation of the real exchange rate and the incipient recovery of global demand, manufacturing exports recovered, after the negative trend they had exhibited during 2015 and in early 2016 (Chart 17a). The recovery of the U.S. external demand relative to its performance in early 2016 would appear to have increased demand for Mexican products in the U.S. In this way, the improvement in Mexican exports was observed in exports to both the U.S. and to the rest of the world. Furthermore, both automotive and non-automotive exports exhibited a recovery (Chart 17b and Chart 17c).

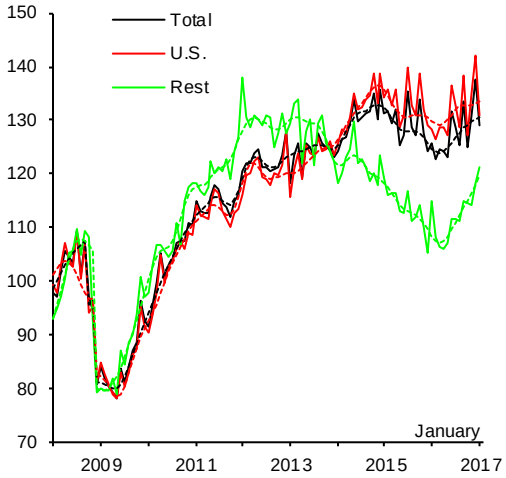
Meanwhile, oil exports also presented a positive trend, despite remaining at low levels. The increment in the period from October 2016 to January 2017 can be explained mainly by a higher average price of the Mexican blend for exports, while the crude oil platform for exports remained relatively stagnant (Chart 17d).

**Chart 17**
**Mexican Exports**
Index 2008=100, s. a.

a) Total Manufacturing Exports

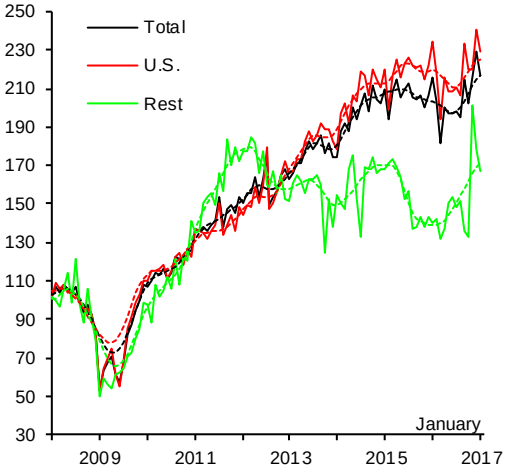



b) Non-automotive Manufacturing Exports



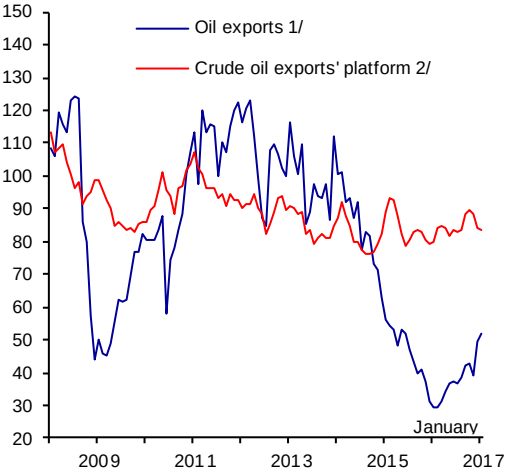

s. a. / Seasonally adjusted and trend data based on information in nominal dollars. The former is represented by a solid line, the latter by a dotted line.
Source: Banco de México with data from SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest.

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 data.
1/ Based on information in nominal dollars.
2/ 3-month moving average of daily barrels of the seasonally adjusted series.
Source: SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest and Banco de México with data from *PMI Comercio Internacional*, S.A. de C.V.

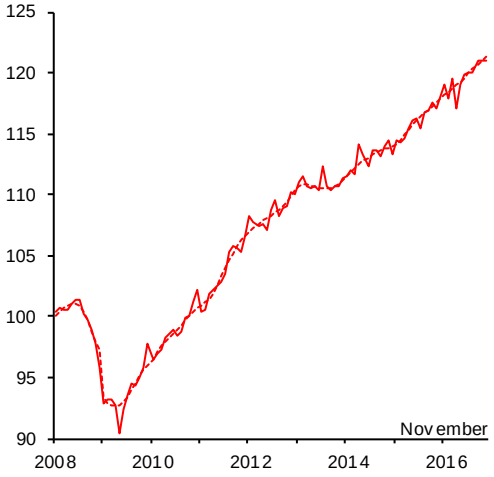
In the reference quarter, private consumption maintained a positive trajectory, following a period of stagnation in the second quarter of 2016. This evolution reflected the dynamism of the component of domestic goods and services, while consumption of imported goods maintained the weak performance shown since mid-2015, which largely responds to the depreciation of the real exchange rate (Chart 18a and Chart 18b).

i. The evolution of consumption in the domestic market during the fourth quarter of 2016 was a consequence, in part, of the continuous improvement in the labor market and, in particular, in the real wage bill, as well as the high expansion rate of consumer credit and workers' remittances, which in the year as a whole presented historically high levels (Chart 19a, Chart 19b and see Section 3.2.3). Nonetheless, consumer confidence kept deteriorating in late 2016 and plunged in January 2017, which could negatively affect the dynamism of consumption in the future (Chart 19c).

ii. In this context, some timely consumption indicators, such as ANTAD sales and light vehicle sales contracted at the end of 2016 and in early 2017, suggesting a deceleration of this aggretate at the beginning of this year.

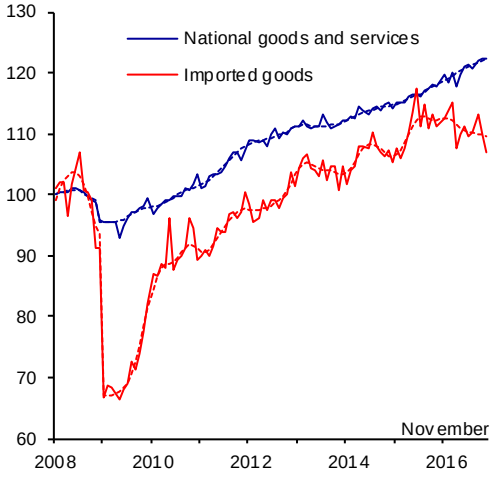
**Chart 18**
**Consumption Indicators**
Index 2008=100, s. a.

a) Monthly Indicator of Domestic Private Consumption




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.

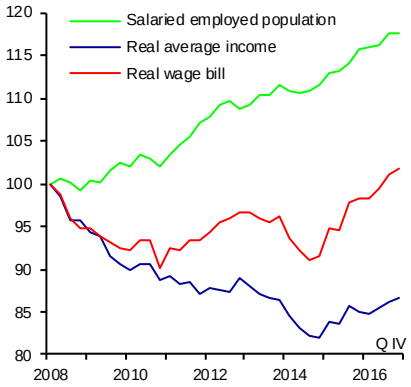
b) Components of the Monthly Indicator of Domestic Private Consumption




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.

**Chart 19**
**Determinants of Consumption**

a) Total Real Wage Bill
Index I-2008=100, s. a.

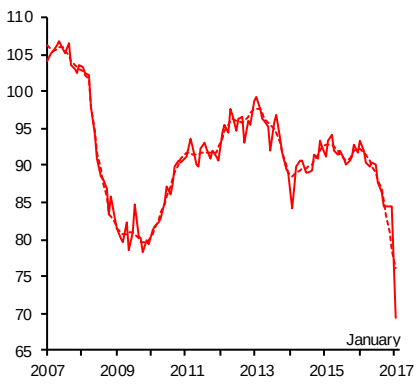



s. a. / Seasonally adjusted data.
Source: Prepared by Banco de México with data from the National Employment Survey (ENOE), INEGI.

b) Workers' Remittances
Billion, constant USD and 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.

c) Consumer Confidence
Index January 2003=100, s. a.



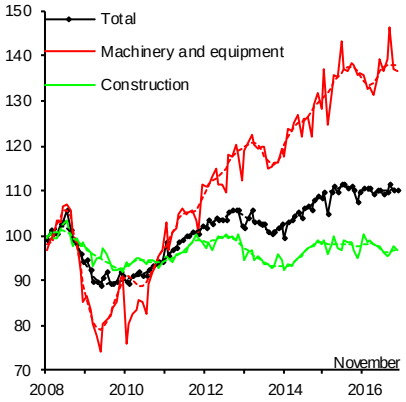

s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
Source: National Consumer Confidence Survey (ENCO), INEGI and Banco de México.

On the other hand, during the last quarter of 2016 gross fixed investment remained stagnant given the weak spending on construction and on imported machinery and equipment, whereas the component of national machinery and equipment has maintained a positive trajectory (Chart 20a and Chart 20b). Within construction, the growing trend exhibited by spending on residential construction has been offset by the negative trend prevailing in non-residential construction, which is in part consequent on the lower activity related to oil wells drilling (Chart 20c). It should be noted that private investment in the country has probably been affected in late 2016 and in early 2017 by the announcements of the incoming U.S. president regarding his intention to implement measures that may hamper the economic relation between Mexico and the U.S. This seems to have negatively affected businesses' confidence.

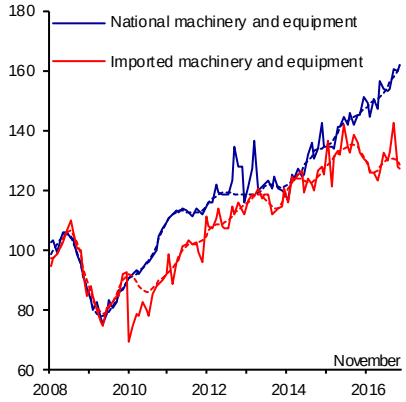
As regards public spending, consistent with the fiscal consolidation effort, during 2016 there were reductions in this component of aggregate demand, particularly in the item of government investment. Thus, the contribution of the public spending to GDP growth in 2016 is estimated to have been slightly negative.

**Chart 20**
**Investment Indicators**
Index 2008=100, s. a.

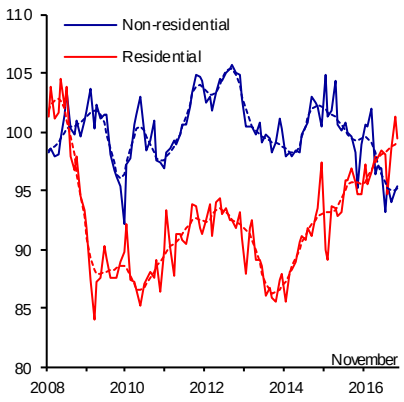
a) Investment and its Components




b) Investment in National and Imported Machinery and Equipment




c) Investment in Residential and Non-residential Construction




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.

Regarding the performance of economic activity from the production side, GDP growth in the last quarter of 2016 continued to reflect the dynamism of services, while the secondary activities as a whole prolonged the stagnation that had been perceived since mid-2014 (Chart 21a).

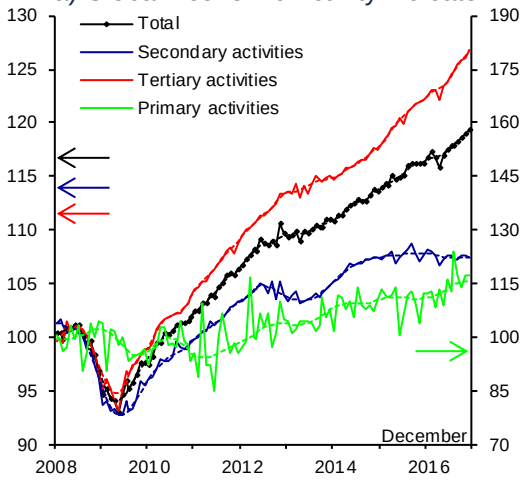
i. Within the industrial production, mining kept falling, as a result of a lower crude oil production platform and a contraction in mining-related services (Chart 21b and Chart 22).

ii. In contrast, in the fourth quarter of 2016, manufacturing production exhibited a positive trend, which seems to have reflected both the improvement in external demand and the dynamism of the domestic market (Chart 21b). In this context, the positive performance of manufacturing during the reference period derived from a recovery both in the component of transport equipment and the aggregate of the rest of manufacturing (Chart 23).

iii. Meanwhile, in the last quarter of 2016 the indicator of the spending on construction –which, unlike that reported in the classification of investment in aggregate demand, excludes oil well drilling- showed an increment with respect to the previous quarter (Chart 21b). Within it, construction and specialized works maintained a positive trend. In contrast, the weakness of the aggregate of civil construction works prevails, reflecting a lower amount of labor force hired by the public sector.

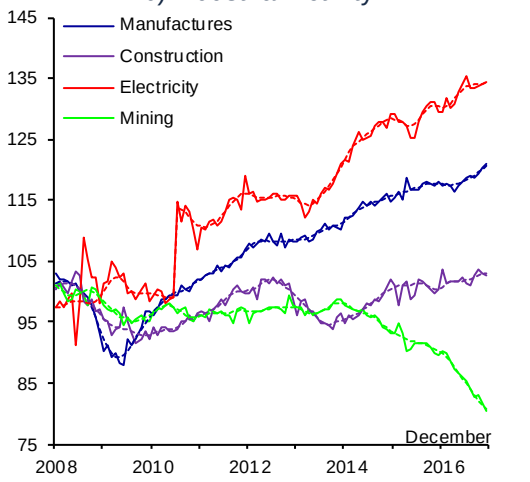
## Chart 21
## Production Indicators
Index 2008=100, s. a.

a) Global Economic Activity Indicator




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.

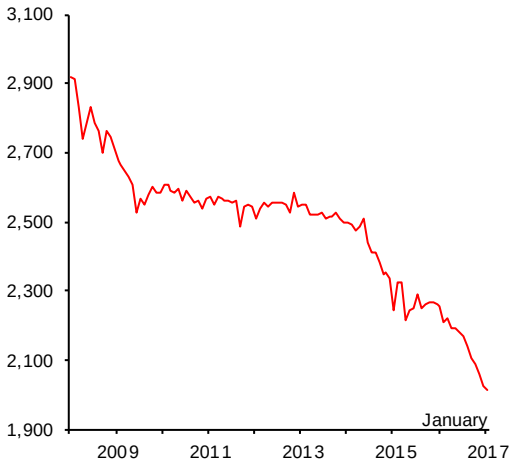
b) Industrial Activity




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

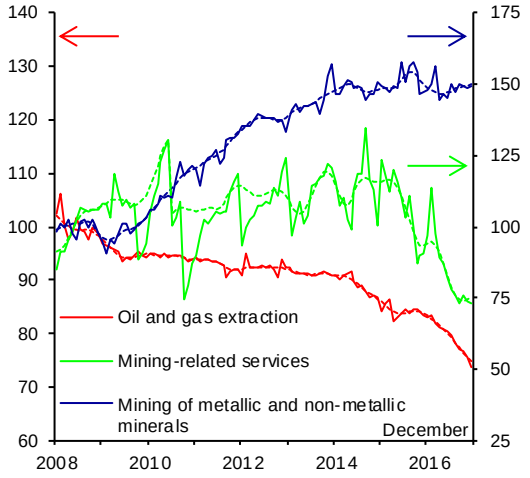
## Chart 22
## Oil Production Platform and Mining Sector

a) Crude Oil Production Platform
Thousands of barrels per day, s. a.




s. a. / Seasonally adjusted data.
Source: Seasonal adjustment by Banco de México with data from PEMEX Institutional Database.

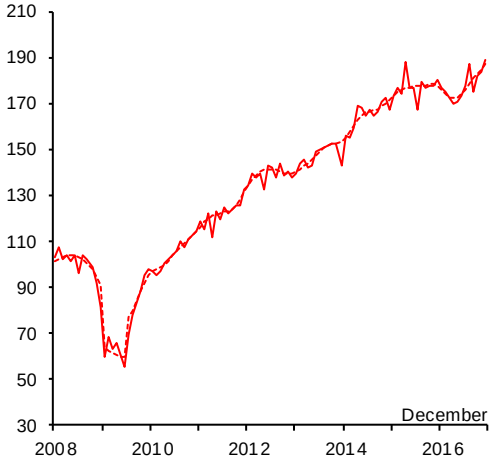
b) Mining Sector
Index 2008=100, s. a.




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

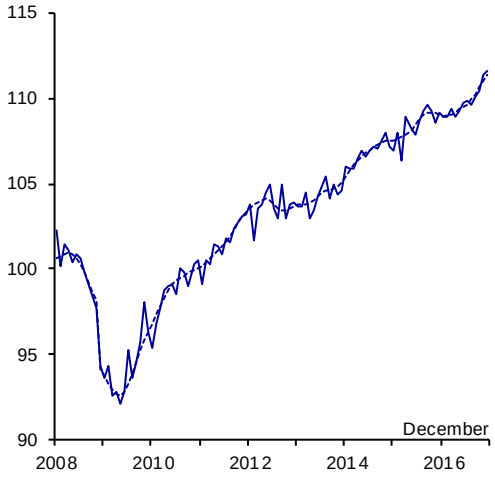
**Chart 23**
**Manufacturing**
Index 2008=100, s. a.

a) Manufacturing Subsector of Transport Equipment




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.

b) Manufacturing Sector Excluding Transport Equipment



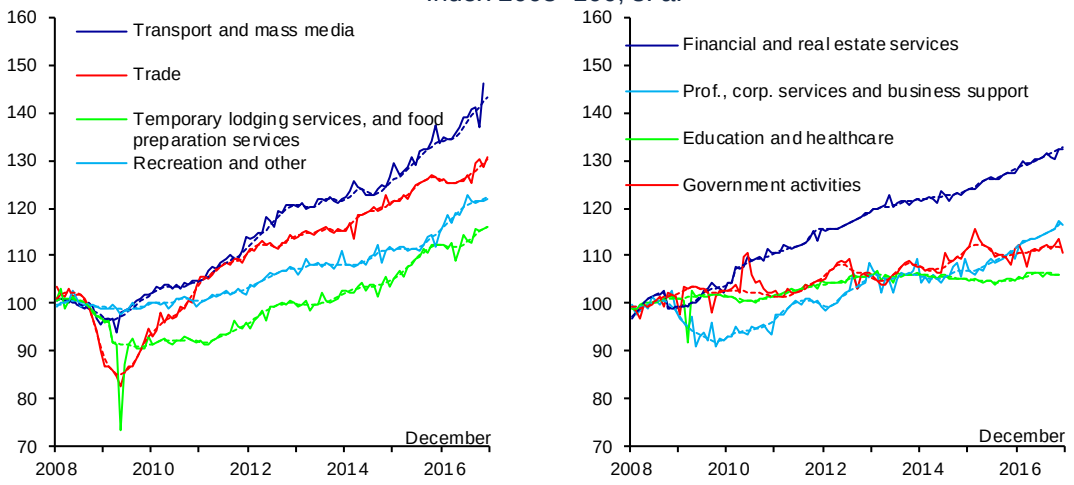

s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
Source: Prepared and seasonally adjusted by Banco de México with data from the Monthly Industrial Activity Indicator, Mexico's National Accounts System (SCNM), INEGI.

iv. As regards services, it is notable that the observed expansion has been practically widespread across all its sectors. This performance reflected the dynamism of the domestic market and the improvement in external demand, which seems to have boosted trade and spending on transport. Additionally, it could also be a reflection of higher tourism activity and a favorable impact of the telecommunications reform (Chart 24).

v. The quarterly (seasonally adjusted) contraction of the primary activities in the fourth quarter of 2016 largely derived from a drop in the area sown, as well as a lower production of some perennial crops.

In this context, in the fourth quarter of 2016, GDP grew 0.7 percent in seasonally adjusted terms, after presenting growth rates of 0.1 and 1.1 percent in the second and the third quarters of that year, respectively (Chart 25a). Based on seasonally adjusted data, economic activity registered an annual expansion of 2.4 percent in the period of October – December 2016, following the rates of 1.6 and 2.0 percent in the second and the third quarters, in the same order. Based on non-seasonally adjusted data, GDP in Mexico presented a rate of growth of 2.4 percent in the reported quarter, which compares with the annual growth of 2.1 percent exhibited in the third quarter and of 2.6 percent in the second one (Chart 25b). Hence, in 2016 as a whole the Mexican economy grew 2.3 percent based on non-seasonally adjusted figures, which was lower than 2.6 percent registered in 2015. Based on seasonally adjusted data, GDP growth in 2016 was 2.1 percent (2.6 percent in 2015), which is a rate lower than that calculated with non-seasonally adjusted figures, given that seasonal adjustment removes the effect of the fact that 2016 was a leap year.

**Chart 24**
**Global Economic Activity Indicator: Services**
Index 2008=100, s. a.

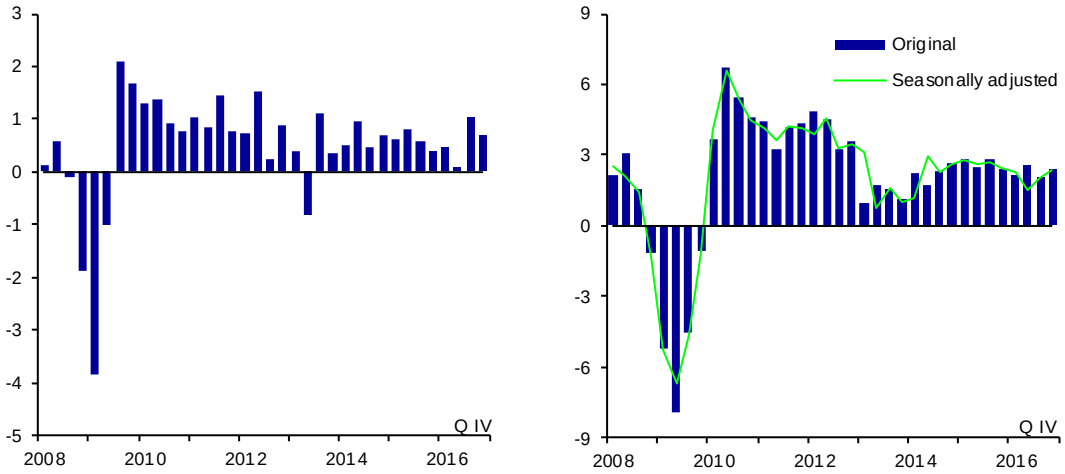



s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
Source: Mexico's National Accounts System (SCNM), INEGI.

**Chart 25**
**Gross Domestic Product**

a) Quarterly Change
Percent, s. a.

b) Annual Change
Percent



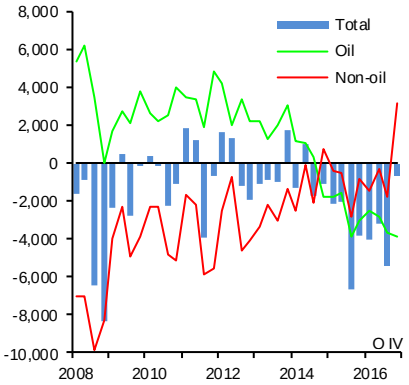

s. a. / Seasonally adjusted data.
Source: Mexico's National Accounts System, INEGI.

During the fourth quarter of 2016, a significant correction was observed in Mexico's external accounts, which was in response to the depreciation of the real exchange rate and the incipient improvement of the external demand. Indeed, during the quarter the largest non-oil trade surplus on record was registered, while the oil trade balance located at levels close to those exhibitied in the previous quarter (Chart 26a). Thus, the deficit of the trade balance shifted from USD 5.3 billion in the third quarter to USD 0.67 billion in the fourth quarter (figures which, as a share of GDP, represent 2.0 and 0.3 percent, respectively). The adjustment of the trade balance, along with the high dynamism of workers' remittances and a higher number of international travelers prompted the deficit of the current account to decrease in the fourth quarter of 2016, registering levels close to 1.3 percent of GDP (USD 3.4

billion), which compares to 2.9 percent of GDP in the third quarter (USD 7.6 billion; Chart 26b and Chart 26c). As a result of the above, in 2016 as a whole the current account observed a deficit of 2.7 percent as a share of GDP (USD 27.9 billion), which is lower than 2.9 percent of GDP exhibited in 2015.

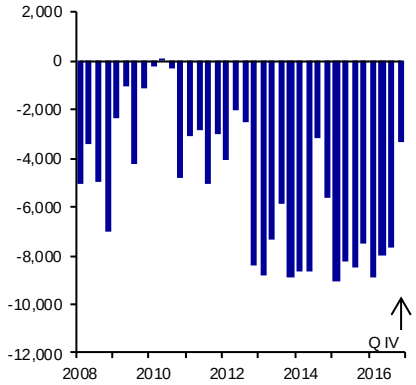
**Chart 26**
**Trade Balance and Current Account**

a) Trade Balance
USD millions



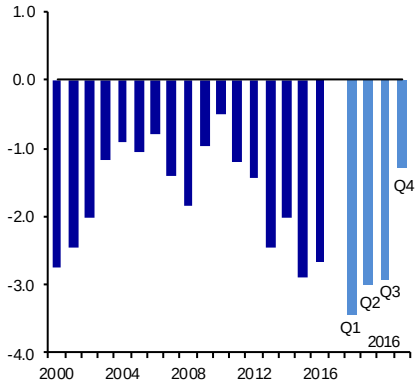

Source: SAT, SE, Banco de México, INEGI. Merchandise Trade Balance. SNIEG. Information of National Interest.

b) Current Account
USD millions




Source: Banco de México.

c) Current Account
Share of GDP




Source: Banco de México and INEGI.

### 3.2.2. Labor Market

In the reference quarter and during the first month of 2017, labor market conditions continued to improve. In particular, both national and urban unemployment rates maintained a decreasing trend and are currently at levels below those registered in 2008, prior to the onset of the global financial crisis (Chart 27a). It is even possible that in light of the favorable performance of the labor market, the gap between the observed unemployment rate and the estimate of the unemployment rate consistent with stable inflation has practically closed (see Box 3). Likewise, the increment in IMSS-insured jobs maintained a positive trend, which contributed to the continuing decreasing trend of the labor informality rate that has been observed since mid-2015 (Chart 27b and Chart 27c). It should be pointed out, however, that the employed population in the last quarter of 2016 was at a level similar to that of the previous quarter, though it lies at high levels (Chart 27c). On the other hand, over the period from October 2016 to January 2017 the labor participation rate presented a certain negative trend (Chart 27d).

## Box 3
## Considerations on the Recent Evolution of NAIRU and Slackness in the Mexican Labor Market

### 1. Introduction

An appropriate reading of the position of economic activity and the utilization of productive resources in the economic cycle is fundamental to conduct monetary policy. If economic activity and resources utilization are clearly and persistently below their potential, it generates downside pressures onto inflation, and vice versa. Given this environment, an adjustment in the monetary policy stance could be advisable. Nonetheless, the phase of the economic cycle is not directly observable, reason why it is necessary to monitor different indicators that allow its approximation. Among them, the output gap is one of the most analyzed measures, given that it estimates the degree of slackness in the market of goods and services. To complement its analysis, it is common to study the indicators of (sub or over) utilization in the markets of factors of production, which are the installed capacity utilization (capital) and labor market indicators.

Considering that the evolution of any macroeconomic variable has both a cyclical and a structural component, one of the main challenges associated to the analysis of slackness indicators is to adequately isolate the cyclical component of macroeconomic variables. An additional challenge regarding the analysis of labor market indicators in Mexico resides in the existence of a large informal sector in the country, which makes the study of its evolution even more difficult. In this sense, the fact that the informality rate tends to be countercyclical and that the informal labor market operates as a shock-absorber of aggregate shocks could complicate the identification of the effective degree of labor market slackness. Likewise, it can distort the information provided by conventional indicators, such as the open unemployment rate.

This Box analyzes the evolution of slack conditions in the Mexican labor market within the conceptual framework of the NAIRU (Non-Accelerating-Inflation Rate of Unemployment), defined as the unemployment rate consistent with an environment of stable inflation. Furthermore, as an additional measure for the analysis of slack conditions in the labor market, considering the high level of informality that exists in Mexico, an extended measure that considers both unemployed individuals and informal salaried employees is estimated, as the latter group tends to concentrate to a higher degree those informal workers who seem to be in this sector inadvertently, given a situation in which they are unable to find employment in the formal sector. The equilibrium value of this extended measure of unemployment and informality, congruent with an environment of stable inflation, is defined as “NAIRU-Inf”.

Derived from uncertainty associated to the measurement of the NAIRU due to its unobservable nature, this Box ponders various methodologies to achieve a more robust estimate. In the same vein, some exercises and stylized facts for Mexico are presented, allowing to provide context to the analysis.

The results suggest that slack conditions in the labor market, estimated based on the difference between the unemployment rate and the corresponding NAIRU, have been presenting a downward trend, which accelerated during last year. It is noteworthy that, despite a slight upward path in the estimations of NAIRU and NAIRU-Inf in recent years, the fact that the indicators of the subutilization of the labor factor declined gradually is mainly the consequence of the recovery observed in the labor market. In particular, the unemployment rate is currently below that of NAIRU and this difference is statistically significant. That is, not only it does not present slack conditions, but it could also suggest pressures onto wages. Nevertheless, the more extended measure, which takes into account the high informality present in the Mexican labor market, is close to its long-term level (NAIRU-Inf), and the difference between them is not significantly different from zero. The latter suggests that, even though the labor factor is close to its full utilization, the market still does not present significant upward pressures onto labor costs. It should be noted that this analysis uses available information up to December 2016, reason why the possible effects generated in the future by potential migratory policies of the incoming U.S. administration on the labor force and the unemployment rate in Mexico are not considered.

### 2. NAIRU

When the unemployment rate is significantly below NAIRU, it is considered that labor market conditions may generate inflation pressures. For a given level of productivity, unemployment levels lower than those consistent with NAIRU could be reflected in wage increments –both observed and expected- which would exercise pressure onto inflation through increases in labor costs. These wage increments could also be reflected in higher aggregate demand for goods and services, further contributing to an increment in inflation pressures. Thus, the difference between the observed unemployment rate and NAIRU (the labor gap) constitutes an indicator of slackness in the labor market, useful to monitor possible risks to inflation derived from input markets. The following section includes different estimates of NAIRU for Mexico and their corresponding levels of slackness in the labor market.

### 3. Estimation of NAIRU and Analysis of Slackness of the Labor Market in Mexico

In general terms, the conceptual framework for the analysis of NAIRU is based on the Phillips curve, which establishes a negative relation between inflation and the "unemployment gap" in the short term:

$$\pi_t = \pi_t^e + \beta(u_t - \bar{u}) + \delta X_t$$

Where $\pi$ is the inflation rate and $\pi^e$ is the expected inflation rate, $(u - \bar{u})$ is the unemployment gap (that is the difference between the observed unemployment rate $(u)$ and NAIRU $(\bar{u})$), and $X$ represents a vector of variables that reflect the presence of supply shocks.

To better approximate the dynamics of the inflation process, the above relation is generalized and, in line with Staiger, Stock and Watson (1997), its estimation is simplified assuming that inflation expectations are adaptive, based on the past inflation. Thus, the model to estimate the Phillips curve takes this form:

$$\Delta\pi_t = \beta(u_t - \bar{u}) + \gamma(L)\Delta\pi_{t-1} + \delta\,(L)X_t + \varepsilon_t \qquad (1)$$

Where $L$ is the operator of lags, $\Delta = 1 - L$, $\gamma(L)$ and $\delta(L)$ are polynomials of lags, and $\varepsilon_t$ is the error term.

Below, this Box presents four estimations of NAIRU in Mexico. Monthly and seasonally adjusted data of the national unemployment rate and core inflation for the period between January 2003 and December 2016 are used.[1]

1. NAIRU: recursive estimation. While reformulating equation (1) to include a constant and, thus, to be able to estimate it, the value of NAIRU can be inferred via the estimation of the following equation:

$$\Delta\pi_t = \alpha + \beta(u_t) + \gamma(L)\Delta\pi_{t-1} + \delta(L)X_t + \varepsilon_t \qquad (2)$$

Therefore, $\beta(u_t - \bar{u})$ in (1) is equal to $\alpha + \beta(u_t)$ in (2), which implies that $\alpha = -\beta(\bar{u})$. Therefore, when estimating $\hat{\alpha}$ and $\hat{\beta}$ via OLS [*with equation (2)*], NAIRU, or the unemployment rate, that neither accelerates nor slows down inflation (that is, the one that attains that $\Delta\pi_t = \Delta\pi_{t-1} = 0$) can be calculated via the following relation:

$$\hat{\bar{u}} = -\hat{\alpha}/\hat{\beta}$$

To allow the relation between unemployment and inflation to vary across time, the trajectory of NAIRU is calculated via the recursive estimation of equation (2), letting the starting point of the sample be fixed (that is, $\hat{\bar{u}}_t = -\hat{\alpha}_t/\hat{\beta}_t$). Through this estimation, it is possible to appreciate how NAIRU has evolved over time as the most recent information of the variables in the model are incorporated.

2. NAIRU Random Walk. As in Gordon (1997), the evolution of NAIRU is obtained from the following system of equations:

$$\Delta\pi_t = \beta(u_t - \bar{u}_t) + \gamma(L)\Delta\pi_{t-1} + \delta(L)X_t + \varepsilon_t$$
$$\bar{u}_t = \bar{u}_{t-1} + e_t \qquad (3)$$

where the errors are assumed i.i.d. $N(0, \sigma_\varepsilon^2)$ and uncorrelated with each other.

3. Random Walk NAIRU and Unemployment Gap AR (1). Following Laubach (2001), this specification models the dynamics of the unemployment rate gap $(u_t - \bar{u}_t)$. In particular, the unemployment gap is modeled as an autoregressive process. This specification allows the unemployment rate not to divert on a permanent basis from NAIRU, that is, the unemployment gap is a process that reverses to zero.

The system of equations to estimate NAIRU is given by:

$$\Delta\pi_t = \beta(u_t - \bar{u}_t) + \gamma(L)\Delta\pi_{t-1} + \delta(L)X_t + \varepsilon_t$$
$$\bar{u}_t = \bar{u}_{t-1} + e_t$$
$$(u_t - \bar{u}_t) = \rho_1(u_{t-1} - \bar{u}_{t-1}) + e_t \qquad (4)$$

where errors are assumed $N(0,\sigma_i^2)$ and uncorrelated with each other, with $i = e, \varepsilon$.

4. NAIRU Random Walk and Unemployment Gap (Okun's Law). Following Gordon (1997), the previous system of equations is modified to include an equation establishing a relation between the unemployment rate and the output gap (Okun's law). Thus, the system of equations to estimate NAIRU is given by:

$$\Delta\pi_t = \beta(u_t - \bar{u}_t) + \gamma(L)\Delta\pi_{t-1} + \delta(L)X_t + \varepsilon_t$$
$$\bar{u}_t = \bar{u}_{t-1} + e_t$$
$$(u_t - \bar{u}_t) = \varphi_t y_t^{gap} + \varepsilon_t$$
$$\varphi_t = \varphi_{t-1} + r_t \qquad (5)$$

where $\varphi$ is Okun coefficient, assumed to change over time and modeled as a random walk, and the errors are assumed to be $N(0,\sigma_r^2)$ and uncorrelated with each other, with $i = e, \varepsilon, r$.

Table 1 presents a summary of the main results and an average estimation based on all methodologies used.

**Table 1**
**Summary: Estimations of NAIRU and Slackness in the Labor Market**

| Date | Oct.15 | Jan.16 | Apr.16 | Jun.16 | Oct.16 | Dec.16 | Oct.15 | Jan.16 | Apr.16 | Jun.16 | Oct.16 | Dec.16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| National unemployment rate (s.a. data.) | 4.43 | 4.18 | 3.91 | 3.91 | 3.57 | 3.66 | | | | | | |
| *NAIRU models* | NAIRU | | | | | | Unemployment gap | | | | | |
| a) Variable coefficients (recursive) | 3.97 | 4.01 | 4.04 | 4.07 | 4.07 | 4.16 | 0.49 | 0.07 | -0.15 | -0.11 | -0.48 | -0.31 |
| b) State - space | | | | | | | | | | | | |
| 1.1 Random walk | 5.05 | 5.07 | 5.08 | 5.08 | 5.10 | 5.10 | -0.59 | -0.99 | -1.19 | -1.13 | -1.51 | -1.26 |
| 1.2 Random walk and unemployment gap AR(1) | 4.62 | 4.55 | 4.49 | 4.48 | 4.40 | 4.42 | -0.17 | -0.47 | -0.60 | -0.52 | -0.81 | -0.58 |
| 1.3 Random walk and Okun's law | 4.33 | 4.27 | 4.20 | 4.17 | 4.11 | 4.11 | 0.13 | -0.18 | -0.31 | -0.21 | -0.53 | -0.26 |
| Average | 4.49 | 4.48 | 4.46 | 4.45 | 4.42 | 4.45 | -0.06 | -0.30 | -0.54 | -0.54 | -0.85 | -0.79 |

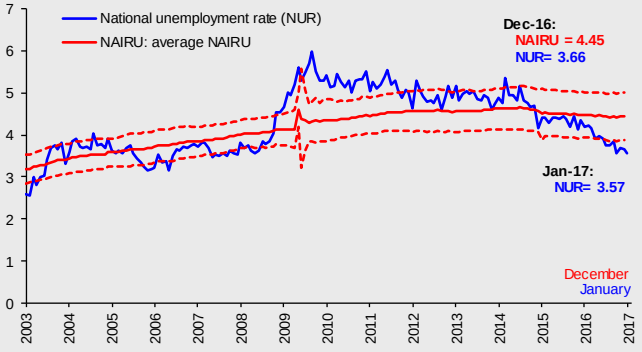
Source: Banco de México and INEGI.

It should be noted that the results obtained using all methodologies are very similar. It is established that the estimated NAIRU presented a slight upward trend, such that the average of the estimations exhibits the same behaviour, and stabilizing to recently lie around 4.45 percent of EAP. This trend could be attributed to the

[1] Two types of models are estimated: 1) the recursive estimation by OLS of the Phillips curve; and 2) the estimation of state-space models with maximum likelihood and Kalman filter.

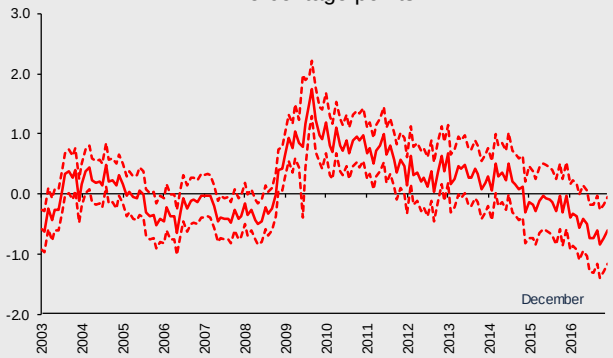
structural changes in the labor market, such as demographic changes possibly associated to lower migration levels to the U.S. and a greater female labor force participation, or to a lower growth rate of productivity, among other factors. This evolution of the different estimations of NAIRU, along with a significant reduction in the observed unemployment rate, generated a decline in labor market slack, which not only seems to have closed last year, but currently the unemployment rate lies below the lower limit of confidence intervals for estimates of NAIRU. It should be noted that uncertainty of the estimates, reflected in the confidence intervals, is considerable, so these results should be interpreted with caution. Chart 1a presents NAIRU obtained as the average of four estimations. Overall, the message does not change: NAIRU has been rising over time and the slackness of the labor market currently seems to be negative (Chart 1b).

**Chart 1a**
**National Unemployment Rate and Average NAIRU**
Percentage, s. a.




Note: For each of the four models, the NAIRU trajectory and the gap are estimated, along with their confidence intervals. Charts 1a and 1b show the average of these estimations, as well as the average of the confidence interval at 90 percent, where the standard error that is used to calculate it is the average of the standard errors of the four estimations. All results point to the same conclusion.
s. a. / Seasonally adjusted data.
Source: Banco de México and INEGI.

**Chart 1b**
**Average Slackness**
Percentage points



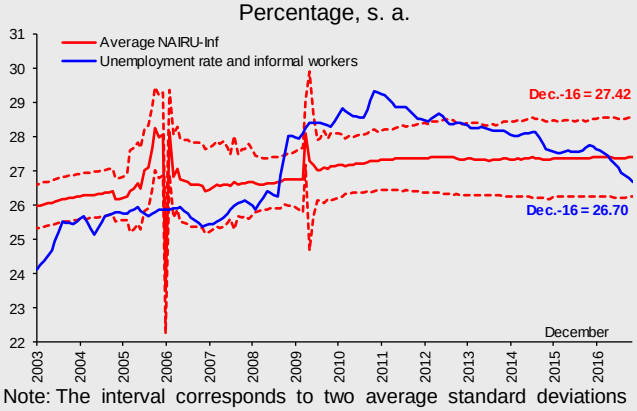

Note: The interval corresponds to two average standard deviations among all estimates.
Source: Banco de México.

## 4. Labor Market Slack in the Context of Mexico

Even though the previous results could suggest inflation pressures derived from labor market indicators, given the presence of a considerable informal labor market in Mexico, it is convenient to take this feature into consideration while reading the cycle. In the informal labor market, sufficient wage flexibility prevails, such that it can absorb most individuals who do not find employment in the formal market. Thus, workers who potentially would be unemployed, can find jobs in the informal sector. Consequently, the unemployment rate in Mexico is low, as it tends to concentrate solely frictional employment and part of the cyclical unemployment. Given the particular features of the Mexican labor market described above, the unemployment rate in Mexico may not fully reflect the labor slack conditions. Furthermore, with a transition of workers from the informal to the formal sector, given that the former is generally less productive than the latter, it is possible to attain greater production without necessarily generating pressures on prices derived from the labor market.

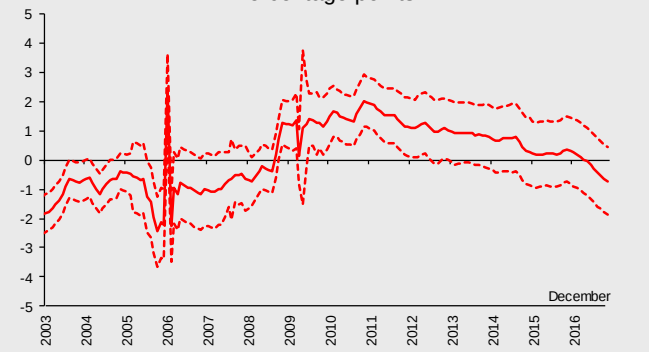
Additionally, the informality rate varies throughout the economic cycle (and apparently it is counter-cyclical, see Alcaraz (2009)). That is, the informal sector acts as a shock-absorber of unemployment, reason why if not considered in the analysis of the labor market, it could lead to inaccurate conclusions. Thus, using the same methodology as in the previous section, another estimation of the unemployment rate and informality congruent with price stability is carried out, based on the unemployment rate plus the informality of the salaried workers (NAIRU-Inf). This extended measure is used, because, according to the literature, the group of informal salaried workers tends to concentrate more involuntary informal workers, that is, those who would rather have a formal employment, but cannot obtain it (see Alcaraz et al. (2015) and Fajnzylber and Maloney et al. (2007)). It should be pointed out that, although NAIRU presented in the previous section is comparable with similar estimations for other countries, the estimates of slackness based on the difference between the extended unemployment rate and NAIRU-Inf reinforce the analysis of slackness in the particular case of the Mexican labor market, given that in this country the informality rate tends to be relatively high. Using this new indicator, it is established that even though slackness has been declining, that is, the unemployment rate plus salaried workers' informality is already below its long-term level (NAIRU-Inf), this difference is not significantly different from zero (Chart 2a and Chart 2b).

**Chart 2a**
**Unemployment Rate and Informal Salaried Workers and Average NAIRU-Inf**
Percentage, s. a.




Note: The interval corresponds to two average standard deviations among all estimations.
s. a. / Seasonally adjusted data.
Source: Banco de México.

**Chart 2b**
**Average Slackness**
Percentage points

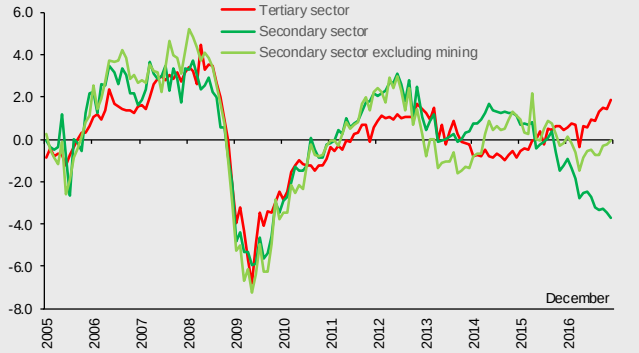



Note: The interval corresponds to two average standard deviations among all estimations.
Source: Banco de México.

As Banco de México documented on several occasions, slackness in the market of goods and services, measured through the output gap, has been negative recently, even though it does not seem to be statistically different from zero either. This suggests an absence of significant aggregate demand-related pressures on prices. To reconcile this result with those found in this Box, slackness is analyzed by sector. In particular, the gap of the IGAE services sector, the most labor-intensive activity, with relatively higher informality and lower wages relative to the industrial sector has closed already (Chart 3). Nonetheless, slackness in the IGAE industrial sector seems to persist. Thus, there could still be a certain reallocation of employment from the services sector (a sector with some activities of a relatively lower productivity) to the industrial sector (characterized by a higher level of productivity, in general), which would generate greater production without necessarily implying inflation pressures.

Thus, the labor market in Mexico seems to have allowed an adjustment in which workers without formal employment could be absorbed by the services sector in lower-paying jobs, with a higher proportion of informal employments. Hence, no wage pressures have been perceived in the sector that apparently presents a positive gap. In other words, the employment composition, which seems to be biased towards certain segments of the services sector (with a higher share of informal workers), could be a reflection of certain hidden "slackness" in informality. Consequently, and considering that labor still has room to reallocate from the services sector to the industrial sector (although slowly), we can state that there is still a certain margin for the labor market to keep recovering and generating greater production, without causing significant wage pressures.

**Chart 3**
**IGAE Gap by Sector** [1/]
Percentage




1/ IGAE gap by sector, measured as a percentage of potential output. The data on the secondary sector is shown including and excluding mining.
Source: Banco de México.

## 5. Final Remarks

Considering that reading the economic cycle is fundamental to conduct monetary policy, this Box analyzes the evolution of slack conditions in the Mexican labor market within the conceptual framework of NAIRU, defined as the unemployment rate that is congruent with an environment of stable inflation. As an additional measure for the analysis of labor market slack, considering informality in Mexico, NAIRU-Inf is estimated based on an extended measure that complements unemployment with data on informal salaried workers, which is the one concentrating to a higher degree informal involuntary workers, that is, those workers who would prefer a formal employment, but cannot obtain it, in view of the cyclical conditions of the economy. The results suggest that the estimations of NAIRU based on the unemployment rate and the extended measures including informality (NAIRU-Inf) have been increasing slightly over time. Furthermore, the measures of subutilization of the labor factor, derived from both estimations, have gradually decreased and this evolution accelerated over the last year. In particular, the unemployment rate is currently

below NAIRU and this difference is statistically significant. Although this may suggest inflation pressures derived from the labor market, the more extended measure that considers high informality present in the Mexican labor market is close to its long-term level (NAIRU-Inf), and the difference between them is not significantly different from zero. This diagnostic is consistent with the fact that there can still be slackness at the aggregate level, as shown by the output gap, while no considerable wage pressures are perceived in the Mexican economy. Thus, given the sectoral composition of employment, there could still be room for greater production, supported by reallocation of employment from the services sector to the industrial sector, without necessarily implying pressures on inflation. Finally, it stands out that the analysis presented here is carried out with the data available up to December 2016. Therefore, the possible effects that could be observed on the labor force and the unemployment rate in Mexico in the future, and, consequently, on the slackness in this market, in light of the implementation of potential migratory policies of the incoming U.S. administration, are not considered.

**References**

Aguilar, A., Alcaraz, C., Ramírez, C., Rodríguez, C. (2017). Consideraciones sobre la Evolución Reciente de la NAIRU y de la Holgura del Mercado Laboral en México. Banco de México, mimeo.

Alcaraz, C., (2009). Informal and formal labour flexibility in Mexico. Desarrollo y sociedad, (63), pp.115-143.

Alcaraz, C., Chiquiar D. and Salcedo A., (2015). Informality and Segmentation in the Mexican Labor Market. Banco de México Working Papers 2015-25.

Gordon, R. J. (1997). The Time-Varying NAIRU and its Implications for Economic Policy, Journal of Economic Perspectives, 11(1), pp. 11-32.

Fajnzylber, P. and Maloney, W. (2007). 'Micro-firm dynamics and informality', in Informality: Exit or Exclusion? G.E. Perry, W.F. Maloney, O.S. Arias, P. Fajnzylber, A.D. Mason and J. Saavedra-Chandunvi (eds), Washington, DC: World Bank, pp.133-156.

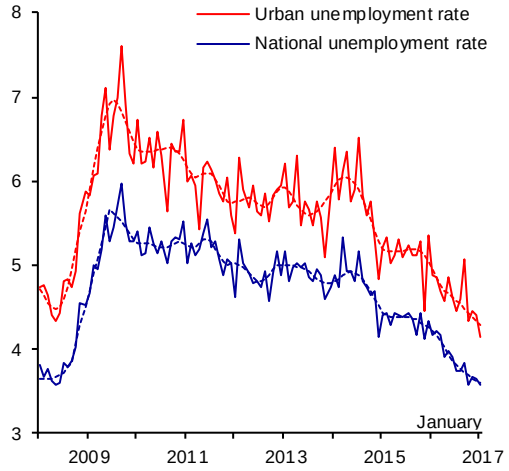
Laubach, T. (2001). Measuring NAIRU: Evidence from Seven Economies, The Review of Economics and Statistics, 83(2), pp. 218-231.

Staiger, D. Stock J.H. and M. W. Watson (1997). How Precise Are Estimates of the Natural Rate of Unemployment in Reducing Inflation?: Motivation and Strategy, C. D. Romer and D. H. Romer Eds., University of Chicago Press.

Staiger, D. Stock J.H. and M. W. Watson (1997). The NAIRU, Unemployment and Monetary Policy, The Journal of Economic Perspectives, 11(1), pp. 33-49.

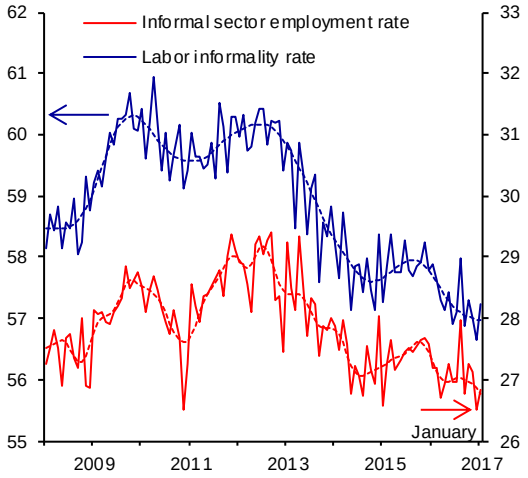
## Chart 27
## Labor Market Indicators

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



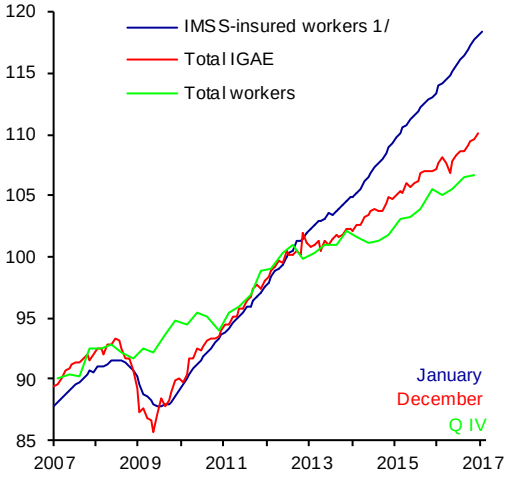

s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
Source: National Employment Survey (ENOE), INEGI.

b) Informal Sector Employment [1/] and Labor Informality [2/]
Percent, s. a.



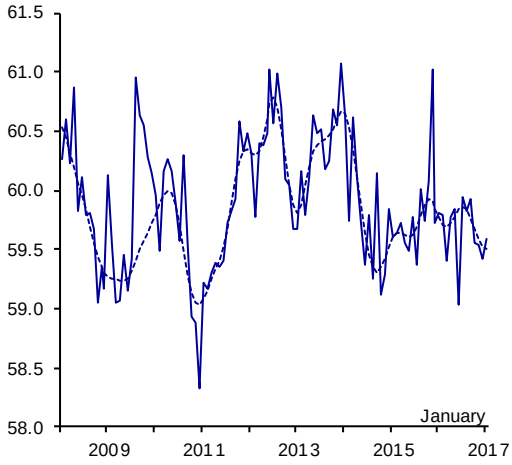

s. a. / Seasonally adjusted and trend data. The former is represented by a solid line, the latter by a dotted line.
1/ It refers to individuals working in non-agricultural economic units, operating with no accounting records and with households' resources.
2/ It includes workers who, besides being employed 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.

c) IMSS-insured Workers, Total IGAE and Working Population
Index 2012=100, s. a.




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) National Labor Participation Rate [1/]
Percent, s. a.




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.

As regards wages, available indicators suggest that in the fourth quarter of 2016 a gradual recovery of wages in real temrs continued.

i. The annual growth rate of the average wage of salaried workers in the economy lied at 4.9 percent in the period of October-December, which is above the figure registered in the previous quarter and the highest since the global financial crisis (Chart 28a). This, along with the inflation evolution, implied an annual increment of 1.6 percent in these salaries in real terms in the last quarter of the year.

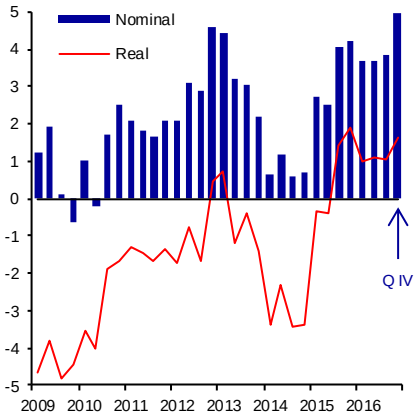
ii. Likewise, in the reported period, the annual growth rate of the daily wage of IMSS-insured workers presented similar increments to those observed over the first three quarters of 2016, thereby maintaining growth in real terms (Chart 28b). In January 2017, these wages presented an average expansion of 4.1 percent, although this month, in view of the evolution of inflation, the annual growth rate in real terms was negative.

iii. In the last quarter of 2016, the growth rate of contractual wages negotiated by firms under federal jurisdiction was slightly lower than that observed in the same quarter of last year (Chart 28c). This reduction is attributed to a lower average increment in wages negotiated by public firms as compared to last year, while the average rate of wage increments negotiated by private firms was higher than in the last quarter of 2015. In January 2017, the wage increment of 4.1 percent was slightly greater than that of 4.0 percent reported in the same month of the previous year, even though the evolution of inflation in that month caused a negative annual change in real terms.

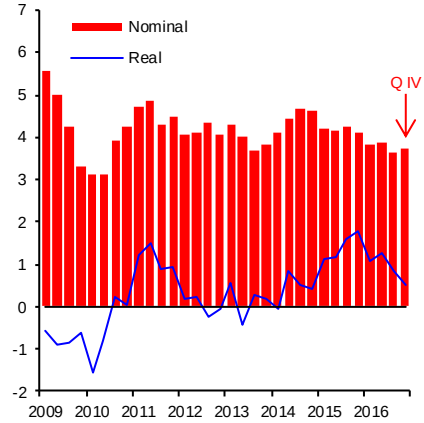
iv. In January 2017, the general minimum wage and minimum wages for professionals increased by 3.9 percent, in addition to the fact that the former received a further increment of four pesos a day, which correspond to the Independent Recovery Amount, which, in line with the data on wages and salaries available so far for the first month of 2016, does not seem to have affected the dynamics of adjustments in the rest of the wage distribution. Indeed, as mentioned in preceding paragraphs, in January 2017 the annual growth of contractual wages negotiated by firms under federal jurisdiction and of wages of IMSS-insured workers were similar to those observed in the first month of last year. In addition, they were also close to the referred percentage increase of the minimum wage, excluding the Independent Recovery Amount.

**Chart 28**
**Wage Indicators**
Annual change in percent

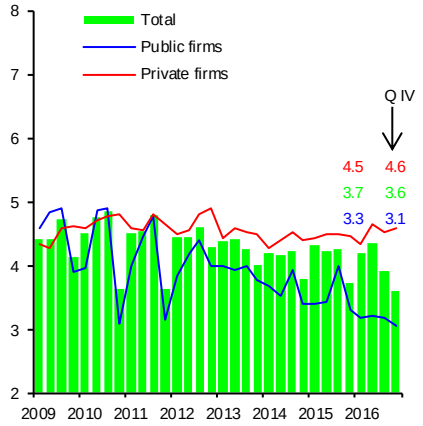
a) Average Wage of Salaried Workers according to National Employment Survey 1/




b) Daily Wage of IMSS-insured Workers 2/




c) Nominal Contractual Wage 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/ During the fourth quarter of 2016, on average 18.8 million workers were registered with IMSS.
3/ The contractual wage increase is on 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.
Source: Calculated by Banco de México with data from IMSS, STPS and INEGI (ENOE).

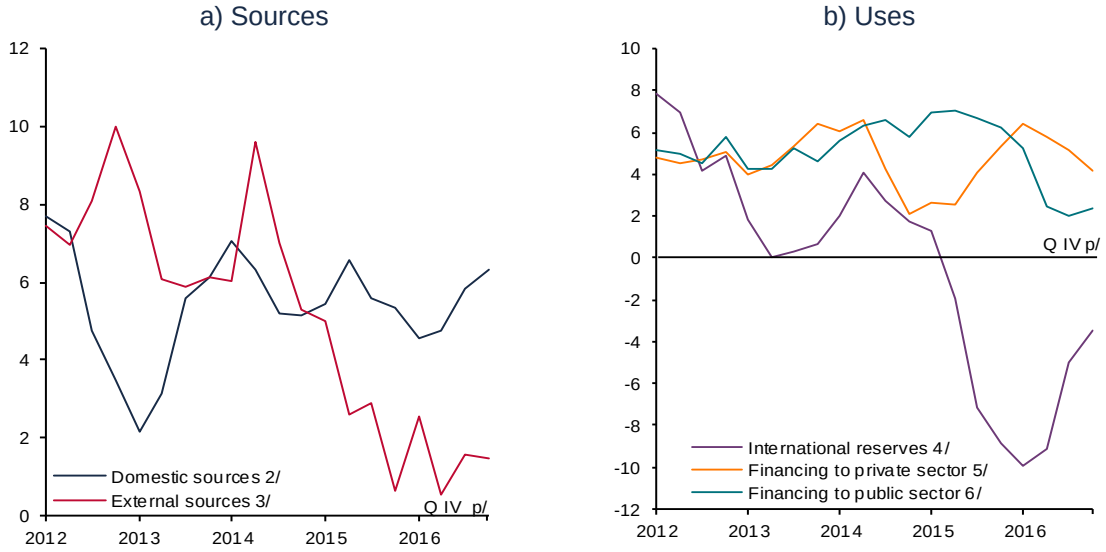
### 3.2.3. Financial Saving and Financing in Mexico [2]

The deceleration of the economic activity of Mexico starting from 2013 and high volatility that has prevailed in international financial markets since the end of 2014 –and in particular the one that affected the national financial markets during 2016-, caused the sources of the financial resources of the economy to grow at lower rates than those registered in previous years. Thus, while in the period between the fourth quarter of 2011 and the third one of 2014 the sources of financial resources expanded at a real average annual rate of 6.3 percent, its average growth between the fourth quarter of 2014 and the last quarter of 2016 reduced to 4.2 percent. In particular, in the fourth quarter of 2016, the sources of financial resources grew at a rate of 4.2 percent, which is similar to 4.0 percent registered in the previous quarter. This resulted from a deceleration in the growth of external sources, while domestic sources maintained their dynamism (Chart 29a and Chart 29b).

As regards domestic sources, the environment of higher interest rates in the domestic markets contributed to the increment in domestic financial saving in the last quarter of 2016 –in particular, its voluntary component- (Chart 30b).[3] Thus, the domestic sources of resources in the economy increased their growth rate from 5.8 to 6.3 percent between the third and the fourth quarters of 2016.

[2] In this section, unless otherwise stated, growth rates are expressed in real annual terms and are calculated based on balances adjusted due to exchange rate and asset price variations.
[3] Financial saving is defined as the monetary aggregate M4 minus the stock of currency held by the public.

**Chart 29**
**Total Funding of the Mexican Economy (Sources and Uses)**
Real annual change in percent 1/

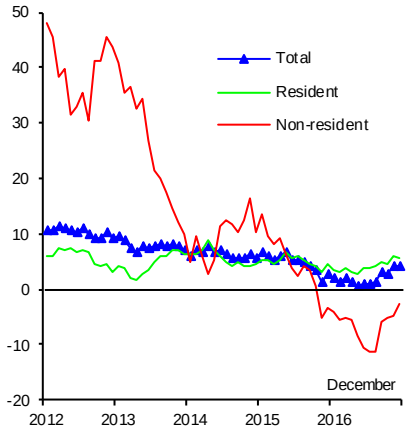



p/ Preliminary data.
1/ Real annual changes are calculated based on balances adjusted due to exchange rate and asset price variation.
2/ It includes the monetary aggregate M4 held by residents.
3/ It includes the monetary aggregate M4 held by non-residents, foreign financing for the federal government, public institutions and enterprises, commercial banks' foreign liabilities and external financing to the non-financial private sector.
4/ It is made up by currencies and gold reserves of Banco de México, free of any security rights and the availability of which is not subject to any type of restriction; the position in favor of Mexico with the IMF derived from contributions to the said entity; currency obtained from financing to realize foreign exchange regulation of the IMF and other entities of international financial cooperation or groups of centrals banks, of central banks and other foreign legal entities that act as financial authorities. Currencies pending to be received for sales transactions against the national currency are not considered, and Banco de México's liabilities in currency and gold are deducted, except for those that are for a term longer than 6 months at the moment of reserves' estimation, and those corresponding to financing obtained to carry out the above mentioned foreign exchange regulation. See Article 19 of 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. It includes restructuring programs.
6/ It includes financing to the federal public sector, as well as financing to states and municipalities.
Source: Banco de México.

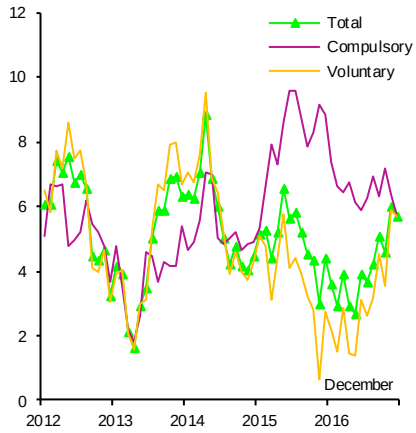
In contrast, the external sources maintained low growth, expanding at a rate of 1.2 percent in real annual terms in the fourth quarter of 2016, which is below 1.5 percent observed in the previous quarter. On the one hand, it derived from sustained reductions in external sources of resources destined to finance firms in Mexico, as a reflection of the environment of high uncertainty in international financial markets and of tighter financing conditions in foreign currency. Additionally, the stock of non-resident financial saving kept contracting in annual terms (-2.7 percent), even after excluding the negative effect of higher interest rates in the quarter on the market valuation of this portfolio (Chart 30a). However, during the quarter there was an increment in non-resident holdings of medium- and long-term government bonds (Chart 30c).

**Chart 30**
**Financial Saving Indicators**

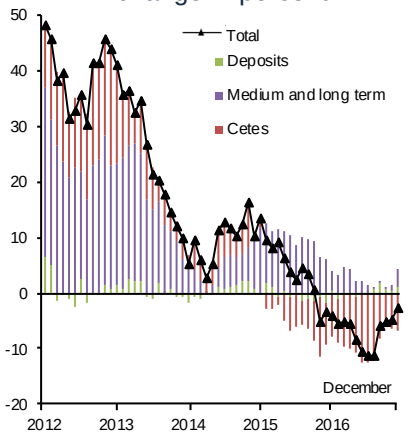
a) Total Financial Saving 1/ 2/
Real annual change in percent




b) Resident Financial Saving 2/
Real annual change in percent




c) Non-resident Financial Saving
Contribution to the real annual change in percent



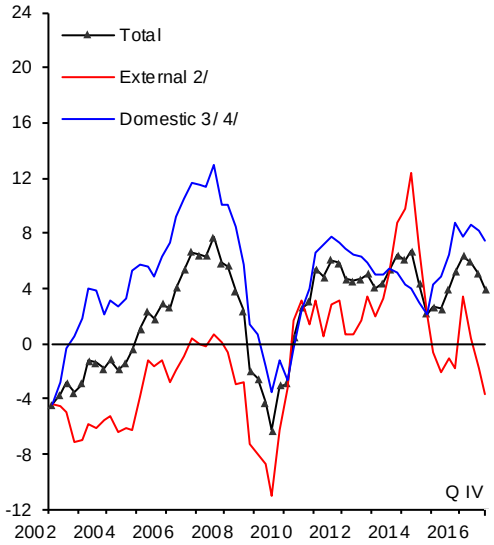

1/ it is defined as the monetary aggregate M4 minus the stock of currency held by the public.
2/ Real annual changes are calculated based on balances adjusted due to exchange rate and asset price variations.
Source: Banco de México.

As regards the use of financial resources of the economy, the annual growth rates of public sector financing and of international reserves have been moderating since mid-2015, which has generated room for financing to the private sector to expand at relatively high rates –even in the above described environment of more limited resources–. In particular, while between the first quarter of 2014 and the second one of 2015 financing to the public sector grew at an average annual rate of 6.4 percent, its growth rate has declined since then, registering an average annual growth of 3.0 percent in 2016. On the other hand, in the fourth quarter of 2016, the stock of international reserves was lower than that observed in the same quarter of the previous year, which was largely attributed to U.S. dollar sales by Banco de México in early 2016. These measures were taken so as to propitiate a more orderly functioning of the foreign exchange market. Furthermore, to the same end, in the first week of January 2017, the Foreign Exchange Commission ordered a direct sale of USD 2 billion to the market. Subsequently, on February 21, the Foreign Exchange Commission announced the implementation of a new foreign exchange market mechanism, which consists of non-deliverable forward (NDF's) auctions, which will be settled in Mexican pesos. The program can size up to 20 billion USD taking into consideration the total nominal amount outstanding that it was announced that the first auction would take place on March 6 for a total notional amount of 1 billion USD. In the same vein, the said Commission ratified that it does not rule out the possibility of additional measures if needed, using foreign exchange hedges or instruments that had been used in the past. It should be noted that the Foreign Exchange Commission reiterated that the anchoring of the value of the national currency will be procured at all times by maintaining solid economic fundamentals.

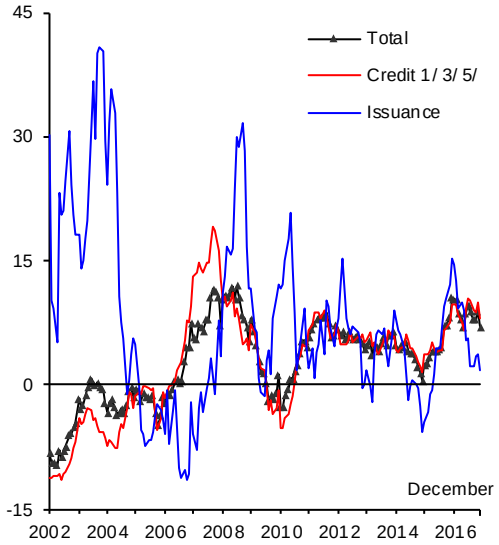
In this context, financing to the private sector kept expanding, although somewhat decelerating in the second half of 2016. Indeed, in the fourth quarter of 2016, total financing to the non-financial private sector presented a real annual growth rate of 3.9 percent, which compares to 5.0 percent in the previous one (Chart 31a).

**Chart 31**
**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

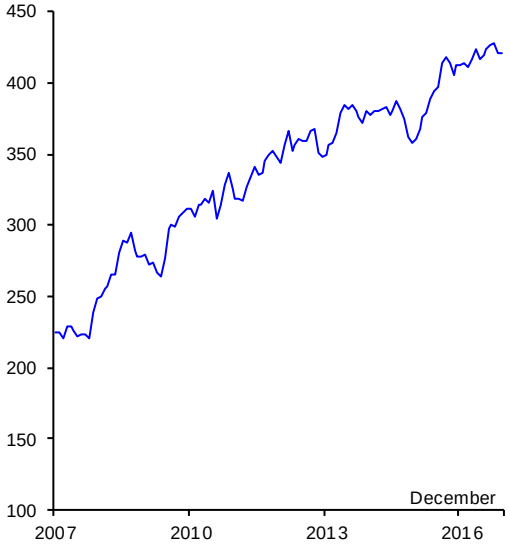



1/ Real annual changes are calculated based on balances adjusted due to exchange rate variations.
2/ Data of foreign financing for the fourth quarter of 2016 are preliminary.
3/ These data can be affected by the disappearance of some non-bank financial intermediaries and their conversion to non-regulated multiple purpose financial corporations (Sofom ENR).
4/ These data can be affected by the disappearance of other non-bank financial intermediaries and their conversion to a non-regulated multiple purpose financial corporation (Sofom ENR).
5/ 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.

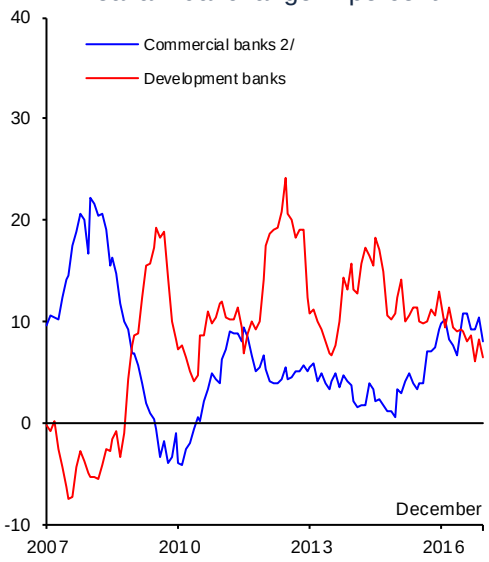
The moderation of the growth rate of financing to the private sector is principally accounted for by a greater contraction of foreign financing during the quarter. In contrast, domestic financing kept growing at relatively high rates, although they were lower than in the previous quarter. Domestic financing to firms expanded at a real annual rate of 7.1 percent in December 2016, figure that compares to 7.9 percent registered in September 2016. This was mainly attributed to the sustained growth of bank credit, while the domestic debt market maintained low dynamism (Chart 31b and Chart 32a). Particularly, commercial banks' performing credit portfolio to non-financial private firms grew at 8.1 percent in real annual terms at the end of the fourth quarter, which, despite being lower than 9.2 percent observed in the previous quarter, exceeds the average growth registered over the last 5 years (Chart 32b). In this context, the costs of loans and lines of credit kept increasing –as a reflection of increments in the Target Rate– (Chart 33a and Chart 33b). On the other hand, the respective delinquency rates remained at low levels, and exhibited a negative trend (Chart 33c).

## Chart 32
## Domestic Financing to Non-financial Private Firms

a) Securities in Circulation
Stocks in MXN billion as of December 2016



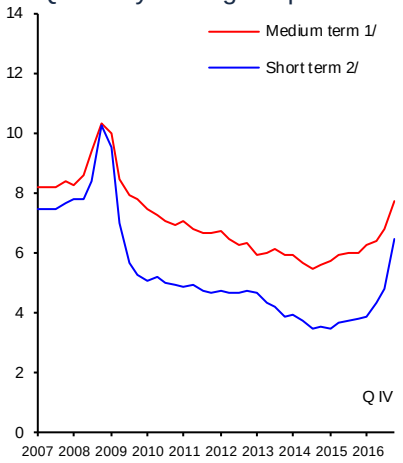

b) Performing Credit [1/]
Real annual change in percent



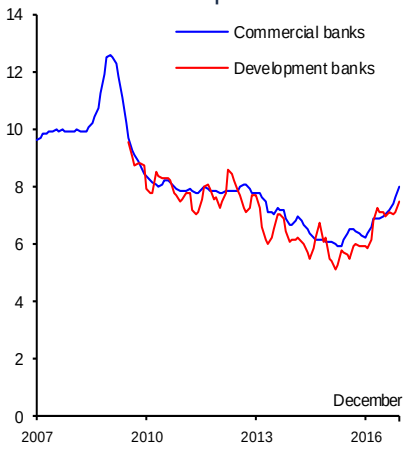

1/ Real annual changes are calculated based on balances adjusted due to exchange rate variations.
2/ It includes Sofomes ER subsidiaries of bank institutions and financial groups. Data are adjusted so as not to be affected by the transfer of bridge loans.
Source: Banco de México.

## Chart 33
## Annual Interest Rates and Delinquency Rates of Non-financial Private Firms

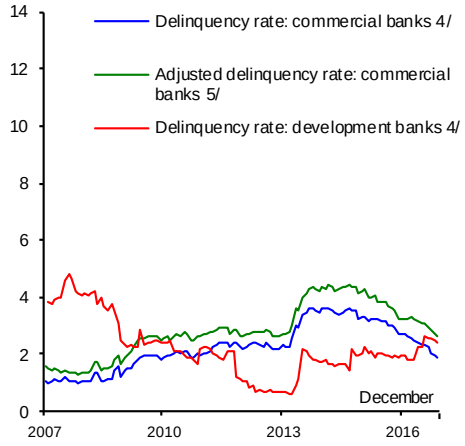
a) Annual Interest Rates of Private Securities
Quarterly average in percent




b) Annual Interest Rates of New Credits [3/]
Annual percent




c) Delinquency Rates
Percent

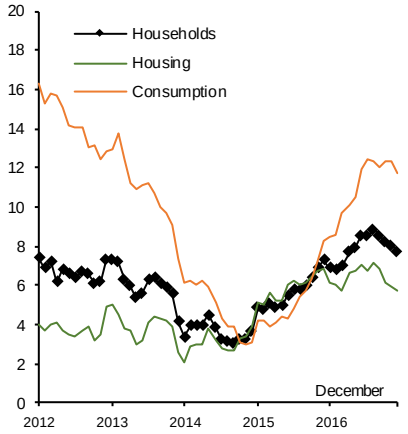



1/ Average weighted yield to maturity of issuances in circulation, with a term over 1 year, at the end of the month.
2/ Average weighted rate of private debt placements, at a term of up to 1 year, expressed in a 28-day curve. It only includes stock exchange certificates.
3/ It refers to the interest 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. It is presented as a 3-month moving average.
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.

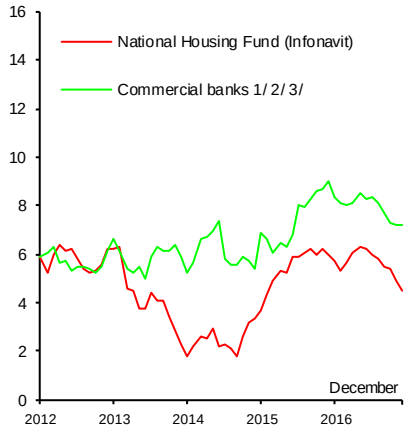
Credit to households expanded at a rate of 7.8 percent in real annual terms in the last quarter of 2016, while in the previous one it grew at a rate of 8.5 percent. This dynamism has been perceived both in the mortgage market and across different segments of consumer credits, largely reflecting an increasing formalization of employment (Chart 34a). With respect to housing loans, both the commercial bank and the National Housing Fund (Infonavit) portfolios –which together constitute 91 percent of total credit in this segment– kept expanding at relatively high rates, even though they were lower than at the end of the previous quarter (Chart 34b).[4] In this environment, the costs of housing loans have not changed significantly and persist at levels around their historic lows. In the same line, delinquency rates in this segment remained relatively low and stable (Chart 34c).

**Chart 34**
**Credit to Households**

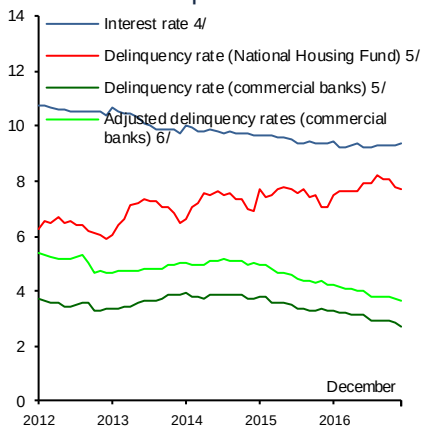
a) Total Credit 1/
Real annual change
in percent




b) Performing Housing Credit
Real annual change in percent




c) Annual Interest Rate of New Credits and Delinquency Rate of the Housing Credit
In percent



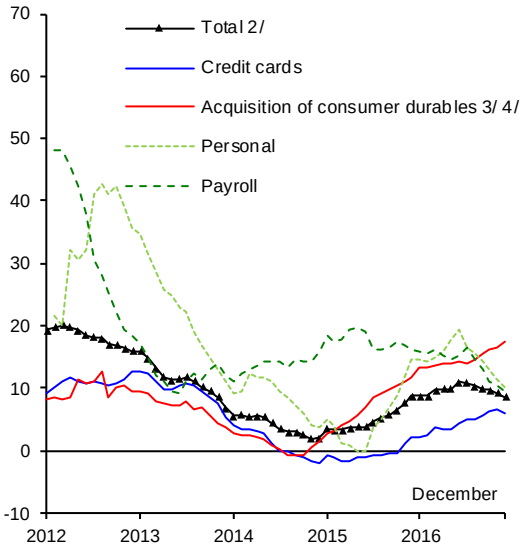

1/ These data are adjusted due to the withdrawal from and the incorporation of some financial intermediaries to the credit statistics.
2/ It includes the Sofomes ER subsidiaries of bank institutions and financial groups.
3/ Figures are adjusted in order to avoid distortions by the transfer and the reclassification 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 stock 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.

Meanwhile, consumer credit kept growing at a high rate, even though it was lower than that in the previous quarter. Within it, the greater growth of automotive credits and credit granted via cards stands out, while the growth rates of payroll and personal credits have been moderating (Chart 34a and Chart 35a). In this environment, the respective interest rates remained stable, except for those associated to credit cards, which kept growing. Likewise, delinquency rates persisted at relatively low levels and in general have not increased significantly, despite a certain deterioration in the payroll credit portfolio over the last two quarters (Chart 35b).

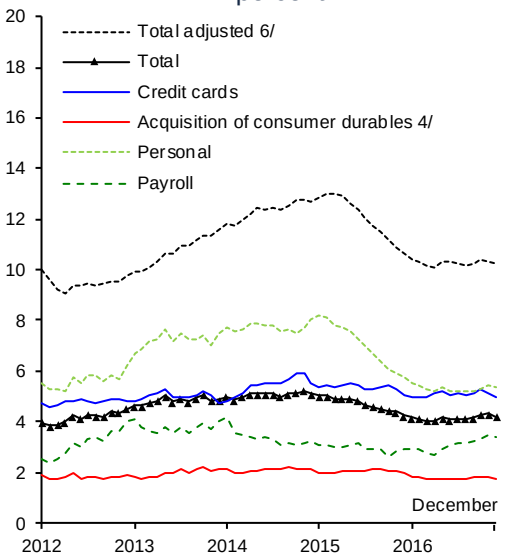
[4] Commercial banks' housing credit includes that for acquisition of new and used housing, remodeling, payment of mortgage liabilities, credit for liquidity, acquisition of land and construction of own housing.

**Chart 35**
**Commercial Bank Consumer Credit**

a) Performing Credit 1/
Real annual change in percent




b) 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/ From July 2011 onwards, figures are adjusted in order to avoid distortions due to the reclassification from acquisition of consumer durables to other consumer credits by one banking institution.
4/ It includes auto loans and credit for acquisition of other movable properties.
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.

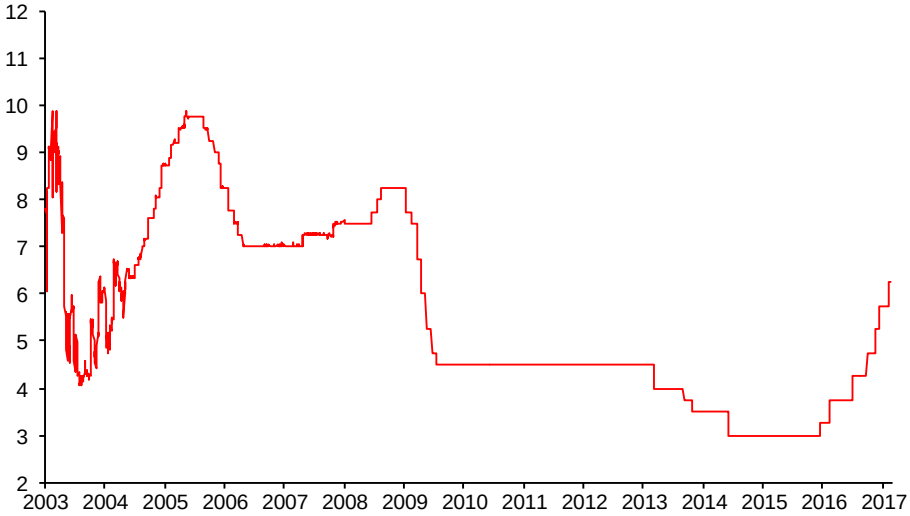
In sum, despite the fact that the environment of high uncertainty in financial markets limited the sources of financial resources of the economy, financing to the private sector kept expanding. In the future, and given the possibility of further volatility episodes that would mitigate the capital inflow to the Mexican economy, fiscal consolidation efforts of the public sector should continue contributing to the growth of financing to the private sector without generating pressures in the loanable funds' markets.

## 4. Monetary Policy and Inflation Determinants

During 2016, the Mexican economy faced an environment that deteriorated throughout the year, especially in the fourth quarter. In particular, volatility in the international financial markets rebounded, which was mainly related to the electoral process in the U.S. and its results. Subsequently, the announcements made by the new U.S. administration regarding its intention to implement an ambitious fiscal expansion generated a widespread appreciation of the U.S. dollar, and an increase in long-term U.S. interest rates, while the outlook for the normalization process of the monetary policy by the Federal Reserve now forecasts that, although still gradually, it will occur at a faster rate than expected prior to its decision of December. This, as well as the uncertainty regarding the impact of the economic policy to be adopted by the new U.S. administration regarding its commercial and migratory relation with Mexico prompted domestic financial markets to be strongly affected, as a result of which the national currency registered high volatility, as well as an additional considerable depreciation, while interest rates for all terms increased. On the domestic side, certain supply shocks affected inflation, highlighting the rise in energy prices. This, together with a number of episodes of depreciation of the Mexican currency during the period covered by this Report caused a spike in inflation expectations, especially in the short-term ones. The change in inflation expectations suggests that a temporary increment in inflation is expected, while medium-term expectations observed much smaller increases.

In this context, in each of the meetings of November 17 and of December 15, 2016, as well as in the meeting of February 9, 2017, the Board of Governors of Banco de México decided to increase the target for the Overnight Interbank Interest Rate by 50 basis points, raising it from a level of 4.75 to 6.25 percent (Chart 36). These adjustments in the monetary policy had the objective to offset the inflation pressures derived from the current juncture, to avoid the contamination of the price formation process of the economy, to anchor inflation expectations and to strengthen the process of inflation convergence to the 3.0 percent target.

**Chart 36**
**Overnight Interbank Interest Rate Target [1/]**
Annual percent




1/ The Overnight Interbank Interest Rate is shown until January 20, 2008.
Source: Banco de México.

Considering the above mentioned monetary policy decisions, the Central Bank increased its reference rate by a total of 300 basis points between 2016 and in 2017 so far, essentially acting in a preemptive manner in light of the environment that had been gradually deteriorating. It should be pointed out that the increment in the monetary policy rate in Mexico during this period has been considerably greater than that in the U.S. It is also worth noting that while making these decisions the monetary authority at all times considered that these actions affect the price formation process of the economy through different channels that comprise the mechanism of the monetary policy transmission with a certain lag. That is, a certain time period elapses for the maximum effect of a change in the interest rate on inflation to be perceived (which is estimated to be between 4 and 5 quarters). In this sense, it would be inefficient and costly in terms of economic activity to try to offset the shocks temporarily affecting inflation in the short term by implementing adjustments in the reference rate. However, through these actions the Central Bank seeks to prevent the different supply shocks mentioned above from altering the price formation process of the economy. Namely, it seeks to prevent second round effects derived from the changes in relative prices. Thus, this Central Institute will monitor that the effects of these increments in the reference rate, as well as those required to be implemented in 2017 will be reflected in the dynamics of future inflation.

It is noteworthy that as a result of the above described strengthening of the monetary policy, the current level of the ex ante real short-term rate, obtained from the difference between the 6.25 percent reference rate and the median of the inflation expectations for the next 12 months of 4.1 percent, lies at 2.15 percent. According to the results of different estimates for the neutral real interest rate in Mexico corresponding to short, medium and long terms, the current ex ante real rate is above the estimated interval for its neutral short-term level (of between 0.1 and 1.8 percent) and within that corresponding to the neutral real interest rate that is expected to be attained in the long term (of between 1.7 and 3.3 percent).[5] It is important to stress that these estimations are subject to high uncertainty.

Among the elements considered to justify the monetary policy decisions made in the period analyzed in this Report, the following stood out:

i. During the fourth quarter of 2016, headline inflation presented an upward trend, which exacerbated in January and in the first fortnight of February 2017, locating at 4.72 and 4.71 percent, respectively, as is detailed in Section 2.

ii. The correlation among the annual changes in the prices of different items has recently increased.

iii. Inflation expectations increased for all terms, even though essentially they still reflect a transitory increment in inflation, as medium- and long-term expectations increased to a smaller extent as compared to short-term ones, which increased significantly.

iv. As regards the evolution of economic activity, there are no significant aggregate demand-related pressures on prices.

[5] For a description of the estimation of the neutral interest rate, see Box “Considerations on the Evolution of the Neutral Interest Rate in Mexico” in the Quarterly Report, July – September 2016.

v. The limited impact that has been generated so far by the increment in the minimum wage on the distribution of wages for the rest of the economy, as explained in Section 3.2.2.

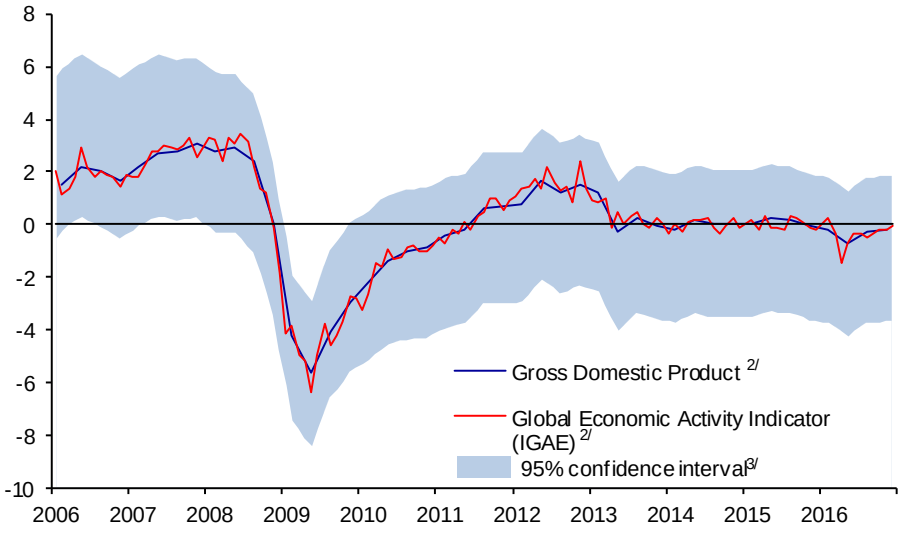
vi. The exchange rate exhibited high volatility, registering episodes of considerable depreciation and reaching a historic intraday level of MXN/USD 22.03 on January 11, 2017. However, when comparing the levels between late September 2016 and mid-February 2017, the Mexican peso registered a marginal depreciation of 1.6 percent. Currently, it lies at a level of MXN/USD 19.80.

vii. Interest rates for all terms increased, pushing the yield curve upwards, although in general short-term ones adjusted to a greater degree than long-term ones. As of January 20, 2017, increments in longer-term rates reversed considerably.

viii. The process of the monetary policy normalization, which is now anticipated to take place at a faster rate than it was expected prior to the elections in the U.S. Thus, interest rates in the U.S. went up, although to a lesser degree than those in Mexico, which prompted interest rate spreads to increase.

As stated above, derived from the recent evolution of economic activity, no significant aggregate demand-related pressures on prices have been perceived (Chart 37). Furthermore, there has been a significant adjustment in the external accounts. However, labor market conditions kept improving. In this juncture, and based on data as of the third quarter of 2016, as a result of the rate of wage growth and the performance of labor productivity, unit labor costs increased for the economy as a whole, even though they still remain below the levels registered prior to the 2008 global financial crisis (Chart 38a). In the same vein, in the quarter October-December 2016, unit labor costs in the manufacturing sector kept presenting an upward trajectory, even though they also lie below the levels observed in 2008 (Chart 38b).

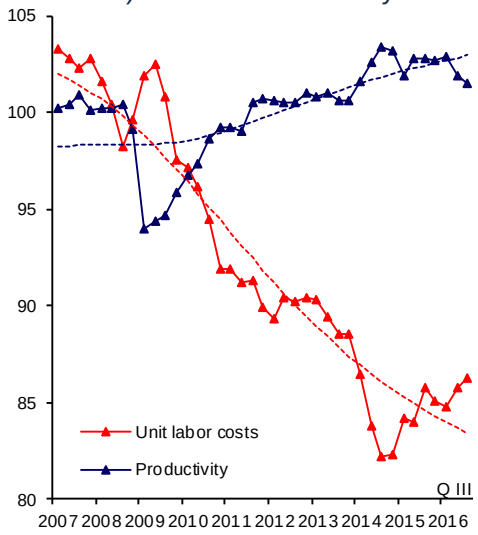
**Chart 37**
**Output Gap Estimate** [1/]
Percentage of potential output, s. a.




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 2016; IGAE figures as of December 2016.
3/ Confidence interval of the output gap calculated with an unobserved components' method.
Source: Estimated by Banco de México with data from INEGI.

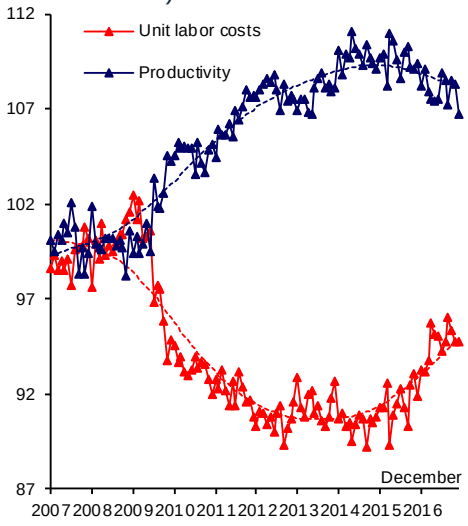
**Chart 38**
**Productivity and Unit Labor Cost**
Index 2008=100, s. a.

a) Total of the Economy




s. a. / Seasonally adjusted and trend series. The former is represented with a solid line, the latter, with a dotted line. Trends estimated by Banco de México.
Source: Unit cost prepared by Banco de México based on data from INEGI. The Global Index of Labor Productivity in the Economy (IGPLE), as released by INEGI.

b) Manufactures



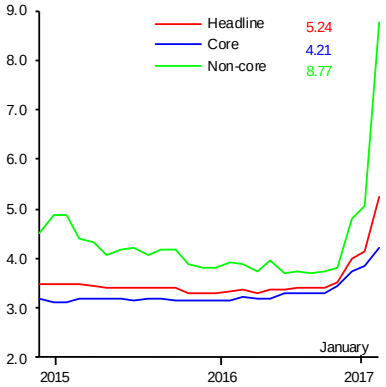

s. a. / Seasonally adjusted and trend series. The former is represented with a solid line, the latter, with a dotted line.
Source: Prepared by Banco de México with seasonally adjusted data from the Monthly Manufacturing Business Survey and the Indicator of Industrial Activity of the Mexico's System of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

Regarding the performance of inflation expectations based on Banco de México's survey among private sector specialists, it is notable that the medians of inflation

expectations increased for all terms. In particular, for the end of 2017, the median spiked as a reflection of the aforementioned shocks on inflation, from 3.4 to 5.2 percent between September 2016 and January 2017 (Chart 39a).[6] The median of core inflation expectations shifted from 3.3 to 4.2 percent and that corresponding to implicit expectations for the non-core component adjusted from 3.7 to 8.8 percent in the referred surveys. This occurred in response to the aforementioned increments in energy prices, which represent changes in relative prices, so that, in light of a monetary policy that aims at preventing second round effects, they should only have a transitory impact on inflation. This is reflected in the evolution of medium-term expectations, which increased to a lesser degree as compared to short-term ones. Thus, the median of expectations at the end of 2018 went up from 3.3 to 3.8 percent in the same period.[7] Specifically, the median of expectations of the core component adjusted from 3.2 to 3.5 percent, while implicit expectations of the non-core component went up from 3.6 to 4.7 percent between the referred surveys (Chart 39b). Likewise, when considering the trajectory of the medians of monthly inflation expectations for each one of the next 12 months, it can be observed that, although in the survey of January 2017 there was a considerable upward adjustment in that corresponding to the same month, the expected dynamics for the remaining months did not change considerably (Chart 40a). Thus, the evolution of the annual inflation implicit in these expectations registers considerable downward adjustment in January 2018, due to the vanishing of the comparison base effect that will impact the measured annual inflation in 2017 (Chart 40b). Finally, expectations for longer-term horizons adjusted to a lesser degree from 3.3 to 3.5 percent (Chart 39c).[8]

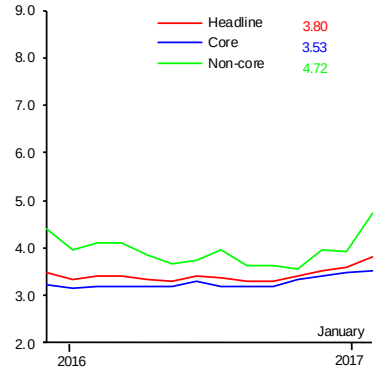
**Chart 39**
**Inflation Expectations**
Percent

a) Medians of Headline, Core and Non-core Inflation Expectations as of End of 2017



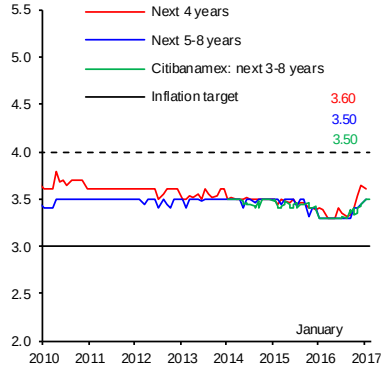

Source: Banco de México's Survey.

b) Medians of Headline, Core and Non-core Inflation Expectations as of End of 2018




Source: Banco de México's Survey.

c) Medians of Headline Inflation Expectations for Different Terms




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

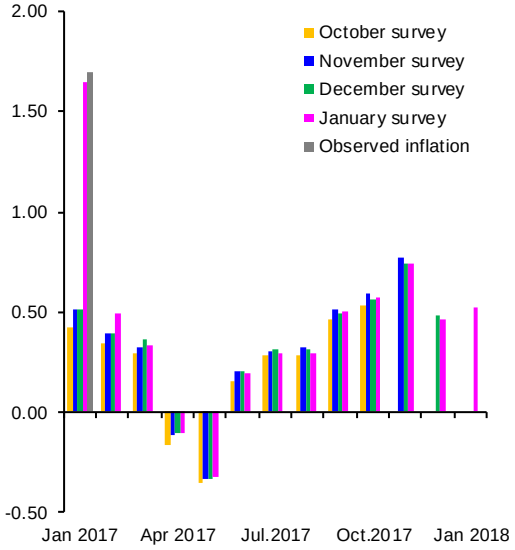
[6] The median of headline inflation expectation for the end of 2017, based on the Citibanamex survey, went up from 3.4 to 5.4 percent between the surveys of September 20, 2016 and February 21, 2017.

[7] The median of headline inflation expectation for the end of 2018, based on the Citibanamex survey, lied at 3.6 percent on February 21, 2017.

[8] As regards the median of long-term inflation expectations, based on the Citibanamex survey (for the next 3-8 years), it went up from 3.4 to 3.5 percent between the surveys of September 20, 2016 and February 21, 2017.

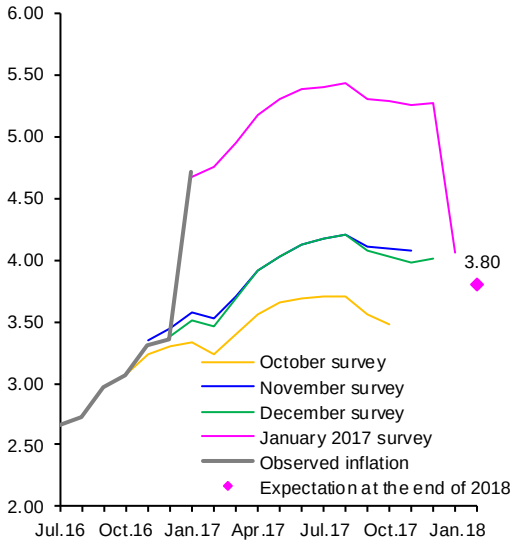
**Chart 40**
**Inflation Expectations**
Percent

a) Median of Monthly Inflation Expectations for January and Next 12 Months




Source: Banco de México's Survey, INEGI.

b) Annual Inflation Implicit in Monthly Inflation Expectations



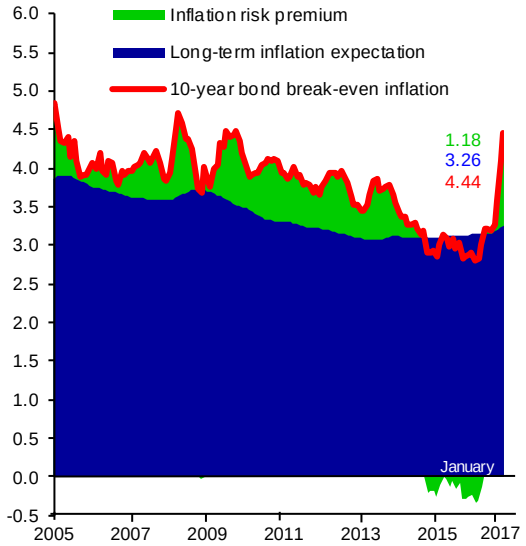

Source: Banco de México's Survey, INEGI.

With respect to inflation expectations implicit in market instruments for long-term horizons (taken from government instruments with maturities of 10 years), they are still slightly above 3 percent, despite recent moderate increments. Meanwhile, the inflation risk premium associated to them increased considerably (Chart 41a). In this way, the increment in the break-even inflation (the difference between long-term nominal and real interest rates) observed between September 2016 and January 2017 seems to be mostly attributed to the increment in the risk premium (Chart 41b).[9] This can be related to a greater dispersion in inflation expectations, associated to high volatility of the exchange rate, the variance of oil and gasoline prices at the international level and the effect of this variability on domestic gasoline prices from now onwards, in light of the expectation of the liberalization process of these prices. However, it should be noted that considering the liquidity spreads between Bonds M and Udibonos, the information provided by the above referred instruments via this estimation has become more uncertain.

[9] For a description of the estimation of long-term inflation expectations, see Box "Decomposition of the Break-even Inflaiton" in the Quarterly Report October – December 2013.

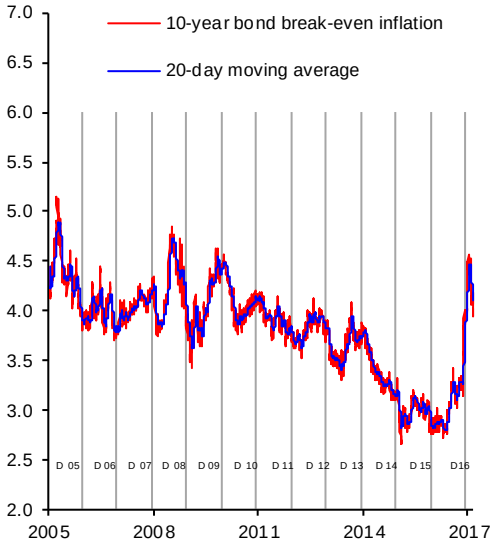
**Chart 41**
**Inflation Expectations**
Percent

a) Decomposition of Break-even Inflation and Inflation Risk




Source: Estimated by Banco de México.

b) 10-year Bond Break-even Inflation



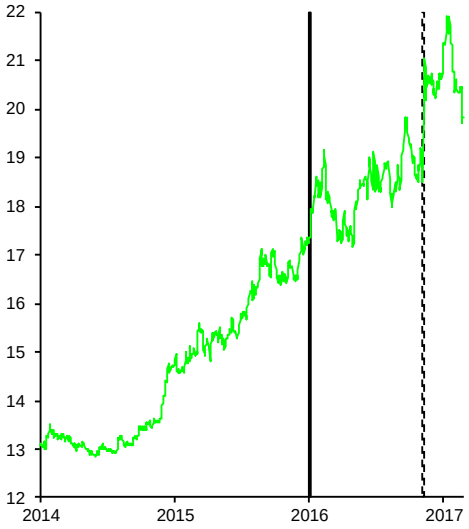

Source: Estimated by Banco de México with data from Valmer and Bloomberg.

As regards the evolution of international financial markets, it stands out that higher volatility registered in late October and early November, largely due to the uncertainty related to the elections in the U.S. and their respective outcome, has tended to decrease. In contrast, volatility in domestic financial markets went up at the beginning of January, mainly in the foreign exchange market, as a reflection of the risk of possible modifications in the Mexico-U.S. relation, even though a reversal in the exchange rate and its volatility has been observed in recent weeks.

In this context, the exchange rate presented high volatility in the reference quarter and in 2017 so far. Thus, after starting the analyzed quarter at MXN/USD 19.50, it depreciated considerably and reached levels of MXN/USD 20.00 and MXN/USD 20.75 in the wake of the elections in the U.S. Subsequently, at the beginning of 2017, in light of a possible more protectionist policy implemented by the U.S. incoming administration, the volatility of the exchange rate increased and it attained a new historic maximum of MXN/USD 21.91, and even reaching a maximum intraday level of MXN/USD 22.03. Finally, after January 20, 2017, it began to revert and to appreciate considerably (Chart 42). This recent evolution of the national currency has been attributed to the monetary policy actions taken by Banco de México, as well as to the measures announced by the Foreign Exchange Commission (see page 53).

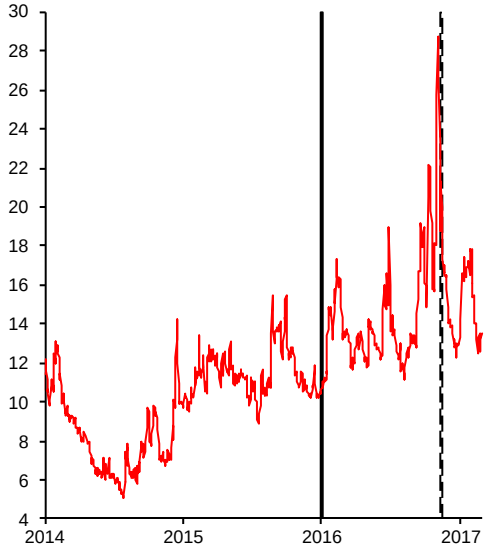
**Chart 42**
**Exchange Rate and Implied Volatility**

a) Nominal Exchange Rate [1/]
MXN/USD




1/ The observed rate is the daily FIX exchange rate. The black vertical line indicates January 1, 2016 and the dotted line indicates November 8, 2016.
Source: Banco de México.

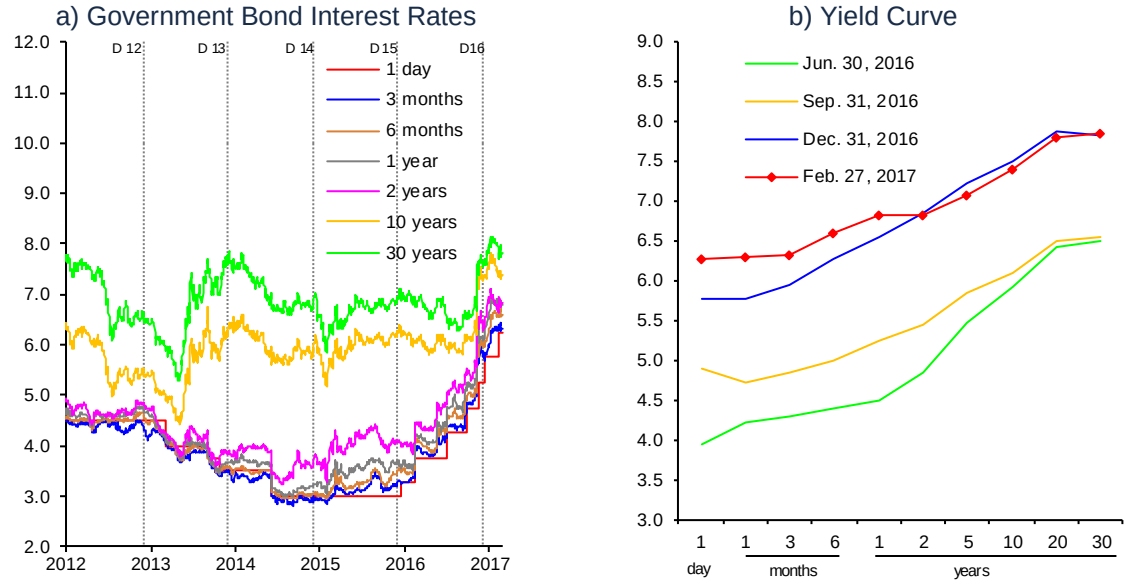
b) Current Option Implied Volatility [1/]
Percent




1/ Currency option implied volatility refers to one-month options. The black vertical line indicates January 1, 2016 and the dotted line indicates November 8, 2016.
Source: Bloomberg.

As regards the evolution of the fixed income market, interest rates for all terms increased during the period covered by this Report. Even though it stands out that starting from January 20, 2017 these increments reversed considerably, though all of them remain at levels above those exhibited prior to the U.S. elections. Thus, between late September 2016 and mid-February 2017, 3-month and 10-year rates shifted from 4.8 to 6.3 percent and from 6.1 to 7.4 percent, respectively (Chart 43a and Chart 43b). Within this evolution, it stands out that generally and in particular after each one of the monetary policy decisions listed in this Report, short-term interest rates adjusted to a larger degree as compared to long-term ones, as a result of which the slope of the yield curve (between 3 months and 10 years) decreased by 30 basis points, from 130 to 110 basis points in this period, thus registering its lowest levels since May 2013. Hence, this indicator plunged from an average level of approximately 300 basis points in 2014 and 2015.

**Chart 43**
**Interest Rates in Mexico**
Percent

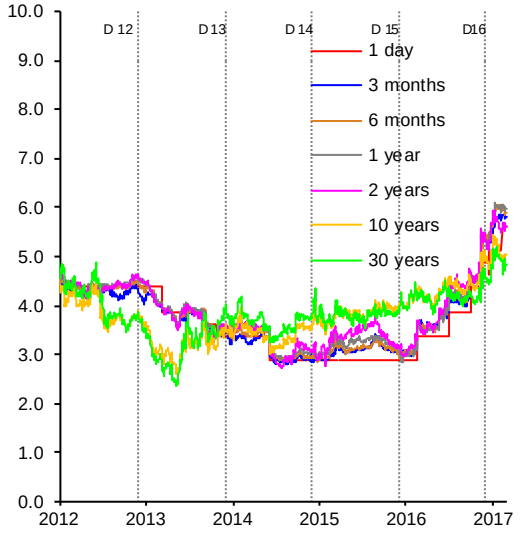



Source: *Proveedor Integral de Precios* (PiP).

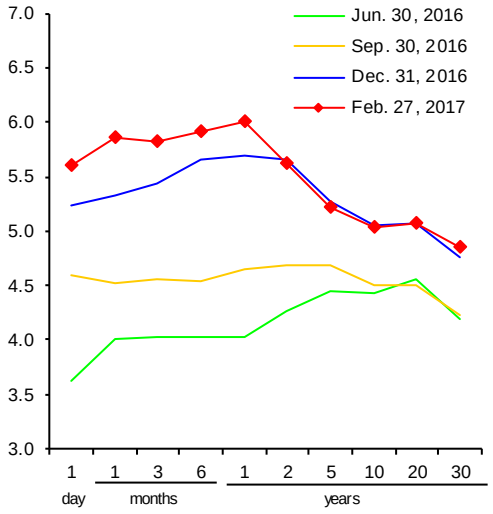
Consistent with the above performance, and given that interest rates in the U.S. raised to a lower degree, the spreads between Mexican and U.S. interest rates increased from the end of the third quarter of 2016 to mid-February 2017 (Chart 44a). Even though in recent weeks longer-term spreads have moderated, they prevail at levels above those prior to the elections in the U.S. In particular, in the period from the end of the third quarter of 2016 to mid-February 2017, the spread of short-term rates (3 months) went up from 450 to 580 basis points, largely as a result of the adjustments in the monetary policy of Mexico. Meanwhile, the 10-year spread shifted from 450 to 500 basis points in the referred period. In this sense, it is noteworthy that during this quarter the curve of the spreads between Mexican and U.S. interest rates (that is, the cross section of these spreads across different terms) registered a significant rise for the short-term spreads, as a result of which this curve inverted. This occurred as a result of the increment in short-term rates in Mexico in view of the monetary policy decisions and the better performance of the long part of the curve in the national currency (Chart 44b).

**Chart 44**
**Spreads between Mexican and U.S. Interest Rates**
Percent

a) Spreads between Mexican and U.S. Interest Rates 1/




b) Curve of Spreads between Mexican and U.S. Interest Rates




1/ For the U.S. target rate, an average interval considered by the Federal Reserve is considered.
Source: *Proveedor Integral de Precios* (PiP) and U.S. Department of the Treasury.

In light of the simultaneity of the adverse environment and different temporary shocks on the relative prices faced by the Mexican economy, the main challenge for the Board of Governors is to prevent the second round effects on inflation and to maintain its medium- and long-term expectations anchored. This considers both the transitory nature of shocks on inflation this year and the horizon in which the monetary policy transmission channels operate, in light of adjustments in the reference rate that were carried out preemptively during 2016, the adjustment in February 2017 and those deemed appropriate for the rest of the year. Thus, this Central Institute will monitor that the effects of the referred increments are reflected in the inflation dynamics, contributing to its efficient convergence to the 3.0 percent target over the last months of 2017 and in 2018.

In the future, given the uncertainty over the economic policy to be implemented in the U.S. and its consequent effects on the bilateral Mexico-U.S. relation, new volatility episodes in international and domestic financial markets cannot be ruled out. In this respect, in a context of the announced fiscal policy of the consolidation of public finances and the Foreign Exchange Commission's commitment to continue monitoring the operating conditions in the foreign exchange market in order to propitiate its more orderly functioning, this Central Institute will continue to contribute to maintain the soundness of the macroeconomic framework of Mexico by procuring price stability. Thus, whenever future circumstances may so require, this Central Bank will adjust its monetary stance at an appropriate pace.

## 5. Inflation Forecasts and Balance of Risks

**GDP Growth Rate:** As described in the previous sections, the Mexican economy continued to expand in the fourth quarter of 2016, reflecting the dynamism of private consumption and the improvement in Mexico's external demand, as a consequence of a moderate recovery of world economic activity and an incipient revival in trade. Thus, even though the growth rate was lower than in the third quarter, it was slightly better than anticipated in the last Report. Therefore, the growth rate for 2016 lied at 2.3 percent, which corresponds to the upper limit of the forecast interval announced in the previous Report.

Looking ahead, world economic growth is still expected to recover gradually over the next years. In particular, greater optimism can be perceived regarding the expected performance in advanced economies, particularly in the U.S.[10] However, these expectations do not seem to fully incorporate possible adverse effects on global economic activity and trade, as a consequence of certain protectionist policies pursued by the new U.S. government. Indeed, despite the prevailing uncertainty regarding the extent and the magnitude of the possible measures adopted by the incoming administration, and regarding the dates of their possible implementation, the economic policy proposals mentioned by the new U.S. government in reference to Mexico already tend to signal that, to a certain degree, it will take actions that would hinder the relation between the two countries. This environment has already affected consumers' and businesses' confidence, foreign direct investment and workers' remittances to Mexico. In this sense, the central growth scenario presented in this Report incorporates a certain deterioration in the expected trade flow between Mexico and the U.S. and a reduced flow of foreign direct investment with respect to that previously expected. Thus, the GDP growth forecasts for Mexico presented in this Report for 2017 and 2018 are adjusted downwards. It should be noted that in line with these expectations, structural reforms will continue boosting economic growth over the next years and the soundness of the macroeconomic framework will also contribute to propitiate a more favorable environment for economic activity, which will allow to partially offset the adverse external environment faced by Mexico. Thus, it is estimated that GDP growth in 2017 will be between 1.3 and 2.3 percent, an interval that is compared to that of 1.5 and 2.5 percent presented in the previous Report. For 2018, the forecast interval is adjusted from one between 2.2 and 3.2 percent to one between 1.7 and 2.7 percent (Chart 45a).

**Employment:** Consistent with the adjustment in the GDP growth, the forecast for the number of IMSS-affiliated jobs is revised downwards for the next years. In particular, for 2017 an increase of between 580 and 680 thousand jobs is expected, which is below that estimated in the previous Report of between 600 and 700 thousand jobs. In the same vein, in 2018 an increase of between 620 to 720

[10] Expectations for the U.S. economy are based on the consensus of analysts surveyed by Blue Chip. In particular, according to the survey of February 2017, GDP growth in the U.S. is expected to be 2.3 and 2.4 percent in 2017 and 2018, respectively. These figures are compared to the expectations of 2.2 and 2.1 percent for the same years, which were available at the moment of the release of the previous Report. Likewise, in line with the same survey, U.S. industrial production is estimated to increase 1.5 percent in 2017 and 2.4 percent in 2018. The forecasts available in the previous Report indicated growth of 1.6 and 2.2 percent for the same years.

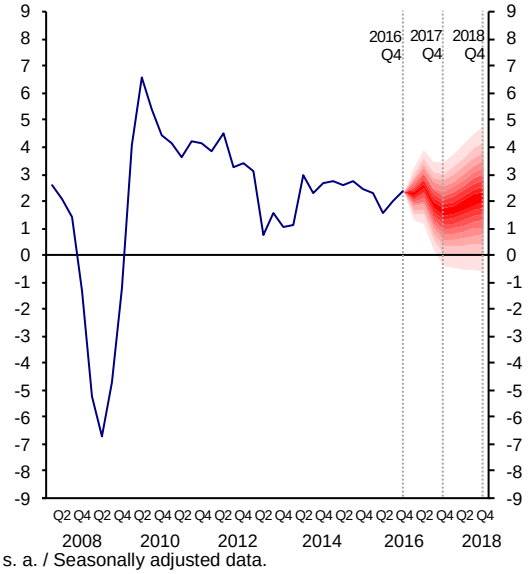
thousand jobs is expected, as compared to 650 to 750 thousand jobs estimated in the previous Report.

**Current Account:** Regarding the external accounts, adjustments observed in the trade balance in the last quarter of 2016, along with the revisions in the growth expectations and the trajectory of the real exchange rate lead to downward revisions in the expectations for the trade balance and current account deficits for 2017 and 2018, relative to those published in the previous Report. In particular, for 2017 deficits in the trade balance and the current account of USD 10.1 and 26.5 billion are anticipated, respectively (1.0 and 2.7 percent of GDP, in the same order). For 2018, deficits in the trade balance and the current account are estimated to amount to USD 9.0 and 27.8 billion, respectively (0.9 and 2.7 percent of GDP, in the same order).

Considering these growth forecasts, no aggregate demand-related pressures onto prices are anticipated in the forecast horizon (Chart 45b).

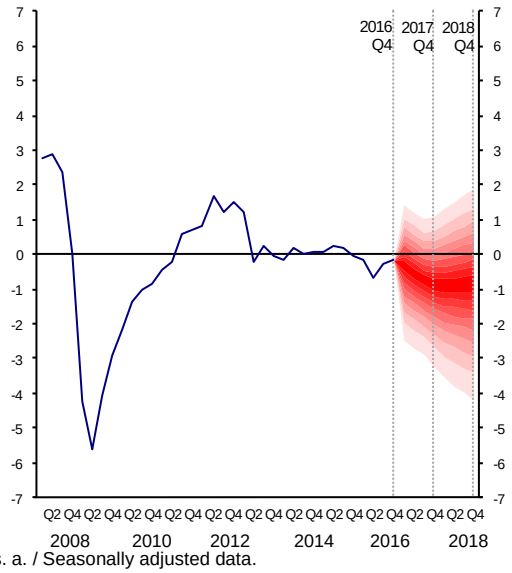
**Chart 45**
**Fan Charts: GDP Growth and Output Gap**

a) GDP Growth, s. a.
Annual percent




s. a. / Seasonally adjusted data.
Source: INEGI and Banco de México.

b) Output Gap Estimate, s. a.
Percentage of potential output




s. a. / Seasonally adjusted data.
Source: Banco de México.

The balance of risks for the growth scenario in Mexico is still biased to the downside. Among downward risks, the following stand out:

i. That some firms decide to cancel or postpone their investment plans in Mexico in light of the recent events in the U.S.

ii. That indeed a highly protectionist trade or fiscal policies are implemented, reducing Mexican exports to the U.S. even more than anticipated, leading to a further deterioration of consumers' and businesses' confidence.

iii. That the rating agencies reduce the credit rating of Mexico, thus affecting investment flows to the country.

iv. That workers' remittances to Mexico are lower than expected, possibly as a consequence of the policies impeding their transfers or of a smaller number of jobs for Mexicans in the U.S.

v. That episodes of high volatility in international financial markets are observed, hence possibly reducing the sources of financing to Mexico, which could derive, among other factors, from uncertainty related to geopolitical events or to the magnitude and the rate of the monetary policy normalization in the U.S.

Among upward risks to growth, the following are noteworthy:

i. That the implementation of structural reforms render higher-than-expected results.

ii. That given the recent exchange rate depreciation, non-oil exports display a more notorious recovery, thus giving a boost to industrial production.

iii. That the implementation of the expansionary fiscal policy in the U.S. has a net positive impact on the Mexican industrial production and on the transfer of workers' remittances to the country, in a scenario in which protectionist trade policies in the U.S. are not so severe.

iv. That the forthcoming negotiations of the Free Trade Agreement with the U.S. reach a favorable outcome, and, in general, that a constructive relation with the Northern neighbor can be consolidated.

**Inflation:** It is estimated that during 2017 headline inflation will exceed the upper limit of the variability interval of Banco de México's target, even though during the last months of 2017 it is expected to resume its trend of convergence towards the target and will lie close to 3 percent in late 2018. Thus, during this year inflation is anticipated to be temporarily affected by both the changes in the relative prices of merchandise with respect of those of services, as a result of the depreciation of the real exchange rate, and the transitory impact of the liberalization of gasoline prices. Likewise, in 2017 core inflation is also estimated to remain at levels above the permanent 3 percent target. Nevertheless, in late 2017 and in 2018 it is expected to resume its trend of converging to the permanent Banco de México's target. The above is expected to occur once the effects of the above mentioned shocks start to fade and the monetary policy measures that have already been implemented, along with those to be adopted in 2017 take effect, in a context in which no aggregate demand-related inflation pressures are anticipated (Chart 46 and Chart 47).

In view of the different shocks that affected the inflation performance, the balance of risks for inflation is considered to have continued deteriorating. Among upward risks, the following should be mentioned:

i. That the number of shocks that have occurred may increase the probability of second round effects onto inflation.

ii. That inflation expectations may rise even further as a consequence of additional depreciations of the national currency, derived from uncertainty still prevailing in the external environment or that, given the national currency depreciation, its pass-through onto prices may increase.

iii. Higher prices of agricultural products, even though their impact onto inflation is expected to be transitory.

Among downward risks, these should be listed:

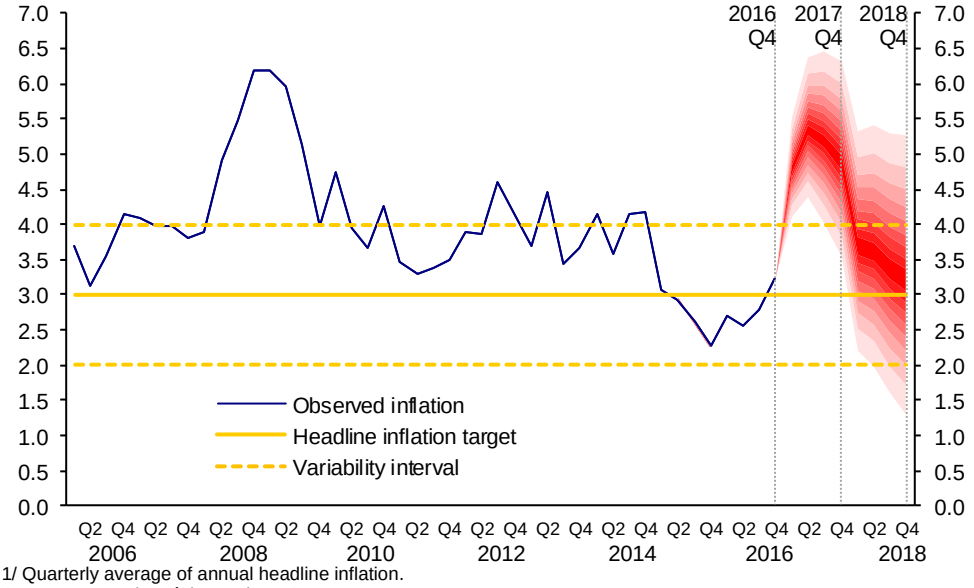
i. A possible appreciation of the national currency.

ii. Further reductions in different prices of the economy, as a consequence of the structural reforms.

iii. That the future performance of the international references and a higher competition among gasoline and other fuels' suppliers in the country would lower the prices of these products.

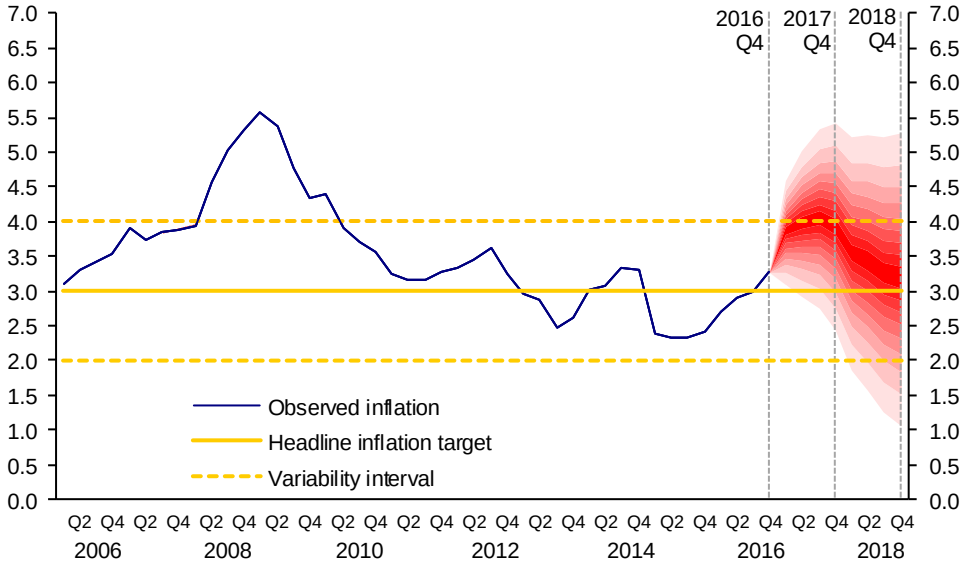
iv. That the national economy may decelerate more than estimated, which would further lower the possibility of aggregate demand-related pressures on inflation.

**Chart 46**
**Fan Chart: Annual Headline Inflation [1/]**
Percent




1/ Quarterly average of annual headline inflation.
Source: Banco de México and INEGI.

**Chart 47**
**Fan Chart: Annual Core Inflation [1/]**
Percent




1/ Quarterly average of annual core inflation.
Source: Banco de México and INEGI.

In this context, in the future the Board of Governors will closely monitor the evolution of all inflation determinants and its medium- and long-term expectations, especially the possible pass-through of exchange rate adjustments and gasoline prices onto the rest of prices. Likewise, it will be watchful of the monetary position of Mexico relative to the U.S., and the evolution of the output gap. This will be done in order to continue taking the necessary measures to consolidate the efficient convergence of inflation to its 3.0 percent target.

Regardless of any external developments, Mexico should continue to boost its competitiveness in the international arena and enhance its growth potential in the domestic market. In this sense, the commitment to implement the approved structural reforms in an adequate and timely manner and to persevere with the fiscal consolidation efforts should be a priority. Likewise, the strengthening of both the microeconomic functioning of the economy and its macroeconomic soundness will allow Mexico to become a more attractive investment destination. Moreover, as stated in previous Reports, it is imperative to strengthen the rule of law and to guarantee legal certainty, so as to propitiate a more favorable environment for growth. All of this has gained even more relevance in view of the challenge faced by Mexico derived from the U.S.' intended economic agenda. In this respect, given the possibility that the U.S. may implement protectionist policies that could impede trade, not only with Mexico but with other economies as well, it is necessary to promote and implement strategies that boost productivity and competitiveness. In the same vein, even though the trade integration of North America has indeed benefitted all members of the block and that further deepening the economic relations could boost the competitiveness of the area against other economic regions, it is imperative to maintain Mexico's trade openness and to seek greater diversification of destination markets for Mexican exports, as well as to diversify the sources of foreign direct investment and imports to the country.

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