

Regional Economic Report

July – September 2019

BANCO DE MÉXICO

December 11, 2019

Outline

I. Regional Economic Report

II. Results July – September 2019

A. Economic activity

B. Inflation

C. Economic outlook

(based on data collected between September 23 and October 17, 2019)

III. Final remarks

Regional Economic Report

- The Regional Economic Report is a quarterly publication on the recent trends in economic activity, inflation and business agents' expectations in Mexico's regions.[1]
- The information presented herein is taken into account by Banco de México's Governing Board when evaluating the economic situation and the forecast for the Mexican economy.
- The economic performance of the regions in Q3 2019 and business agents' prospects for regional economic activity and inflation over the following 12 months are analyzed herein.

[1] For the purposes of this Report, Mexico's states are grouped into the following four regions. Northern: Baja California, Chihuahua, Coahuila, Nuevo León, Sonora and Tamaulipas. North-Central: Aguascalientes, Baja California Sur, Colima, Durango, Jalisco, Michoacán, Nayarit, San Luis Potosí, Sinaloa and Zacatecas. Central: Ciudad de México, Estado de México, Guanajuato, Hidalgo, Morelos, Puebla, Querétaro and Tlaxcala. Southern: Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz and Yucatán.

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Regional Economic Activity

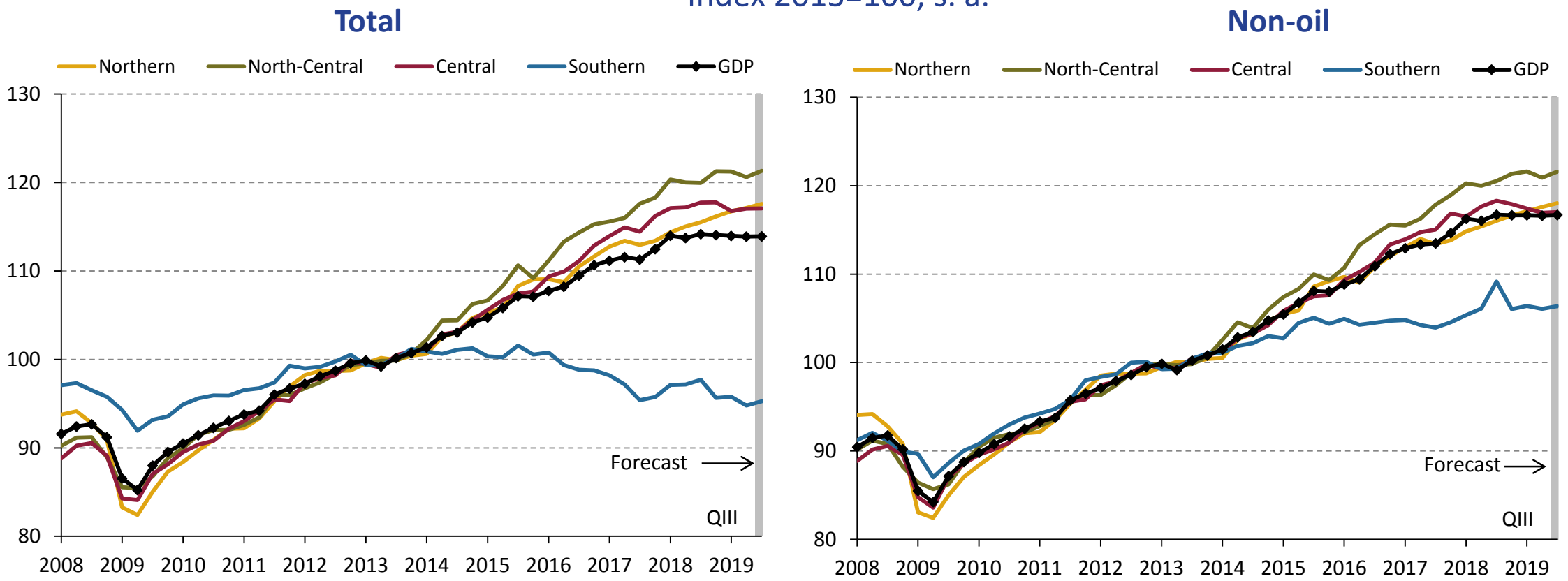
- During Q3 2019, Mexico's GDP remained at levels similar to those of the previous quarter, after having exhibited slight consecutive falls from Q4 2018 to Q2 2019, according to most recent data.
  - ✓ This behavior reflected the loss of dynamism of aggregate demand, in a context in which uncertainty associated to both external and domestic factors prevailed.

- The weakness of Mexico's economic activity reflected the lack of dynamism exhibited by the Central and Southern regions.

Economic activity in the Central region is estimated to have remained at levels similar to those in Q2. Although the North-Central and Southern regions are foreseen to have grown, such an expansion would have occurred after the falls observed in Q2, and, hence, economic activity in these regions would continue to be at levels similar to those observed in late 2018. In contrast, the Northern region is expected to continue following a positive trend.

Quarterly Indicator of Regional Economic Activity 1/

Index 2013=100, s. a.



s. a. / Seasonally adjusted data.

1/ The value of Gross Domestic Product (GDP) for Q3 2019 corresponds to observed data.

Source: Estimated by Banco de México with seasonally adjusted series of domestic GDP and the Quarterly Indicator of Economic Activity by State. *Instituto Nacional de Estadística y Geografía* (INEGI, for its acronym in Spanish).

Measure of Productivity by Unit of Luminosity in Mexican States

- The use of **luminosity** images taken from space is increasingly common to estimate and/or analyze economic activity across different regions of the world.
- This Box proposes the use of luminosity data as a measure of production *inputs* used in an economy.
  - ✓ Under this interpretation, the economic activity level generated by luminosity can be estimated (controlling for sectoral composition and population, as well) for all Mexican states. Said level can be compared to the GDP that the same luminosity level would generate in the U.S., which can be assumed as the country with the greatest productivity level by luminosity unit that can possibly be achieved.
- The results indicate that states in the Northern region are, on average, closer to the maximum productivity level, followed by states in the central regions. In contrast, states in the south are the farthest from the highest productivity level by luminosity unit.

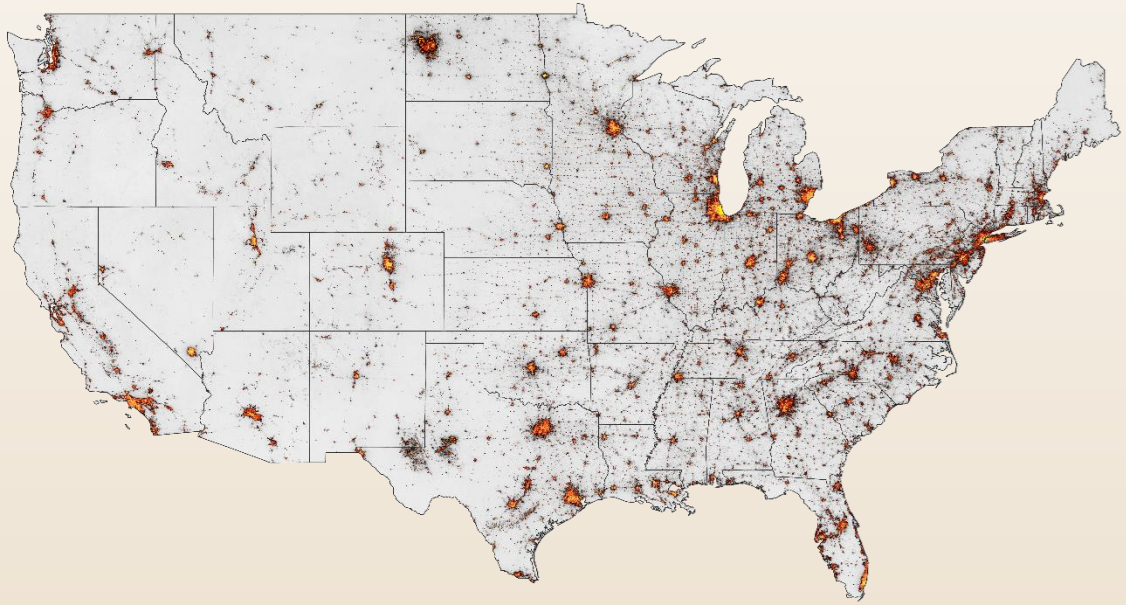
Measure of Productivity by Unit of Luminosity in Mexican States

Satellite image of night lights 2015

a) Mexico



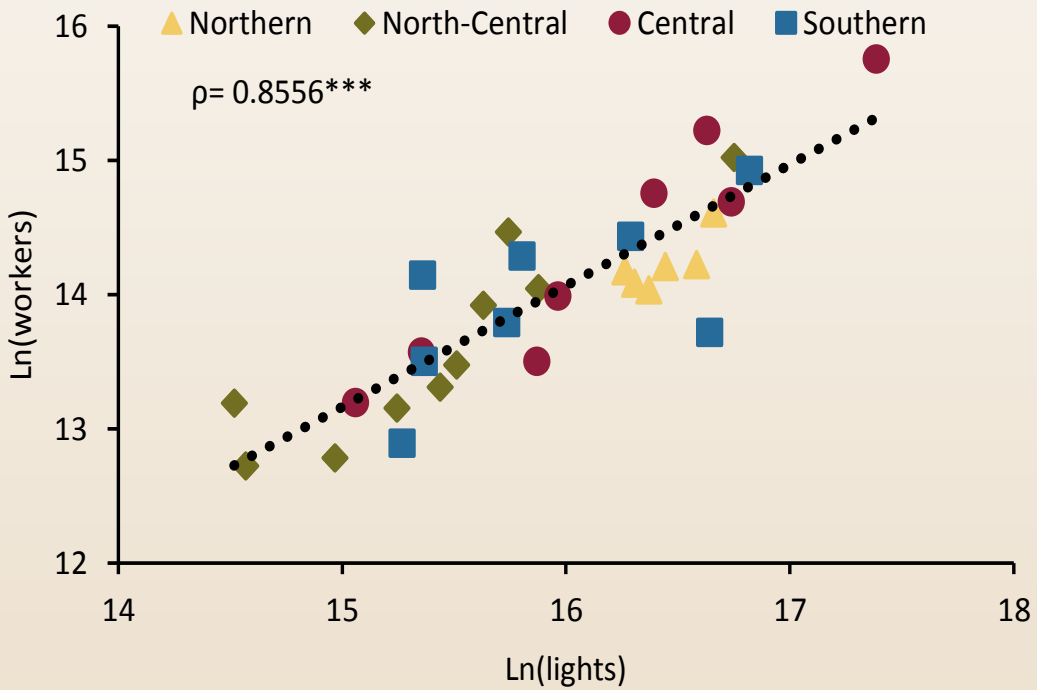
b) United States



Source: Prepared by Banco de México with data from NASA/NOAA-VIIRS.

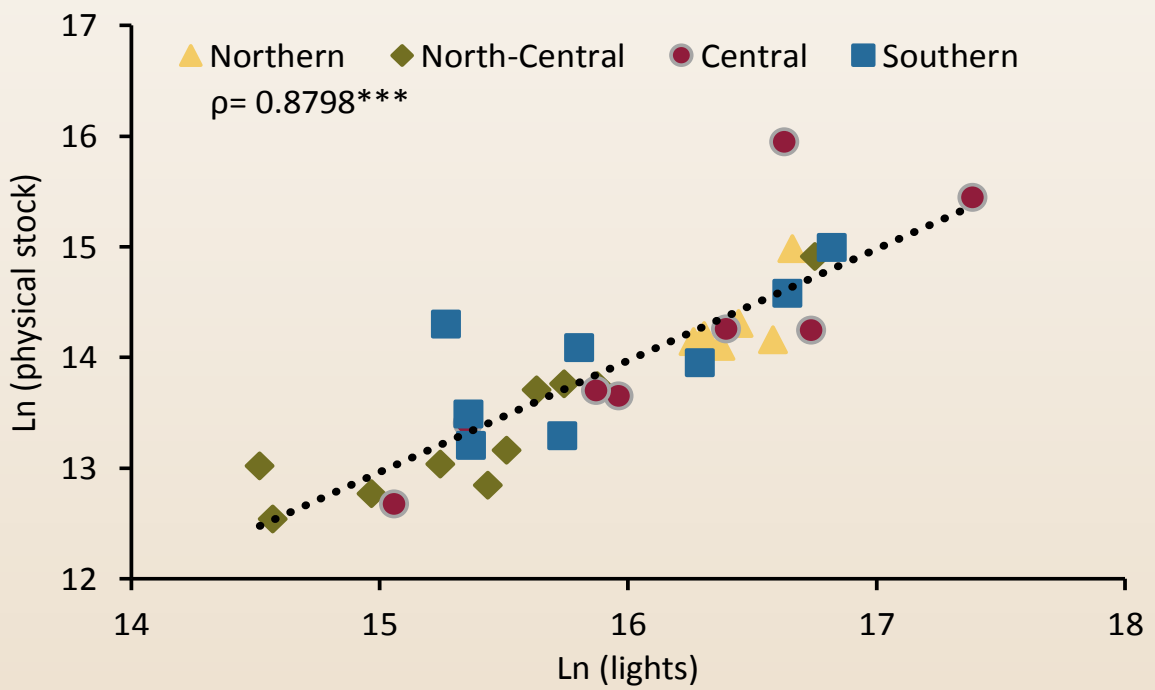
Measure of Productivity by Unit of Luminosity in Mexican States

Luminosity and Total Workers in Mexico



Note: Data for the physical capital stock correspond to 2013, while luminosity data correspond to 2015.
*** p<0.01. The presented correlation coefficient corresponds to that of Spearman.
Source: Estimated by Banco de México with data from INEGI, BEA, U.S. and NASA/NOAA-VIIRS. Data for 2015.

Luminosity and Physical Capital Stock in Mexico



Note: Data for the physical capital stock correspond to 2013, while luminosity data correspond to 2015.
*** p<0.01. The presented correlation coefficient corresponds to that of Spearman.
Source: Estimated by Banco de México with data from INEGI, BEA, U.S. and NASA/NOAA-VIIRS.

Measure of Productivity by Unit of Luminosity in Mexican States

US production function:

$$\widehat{GDP}_i^{US} = F^{US}(Luminosity\ by\ sector_i^{US}, Population_i^{US})$$

Estimate of GDP that Mexico's luminosity would generate if it had the US production function:

$$\widehat{GDP}_i^{MX_{US}} = F^{US}(Luminosity\ by\ sector_i^{MX}, Population_i^{MX})$$

Mexico's production function:

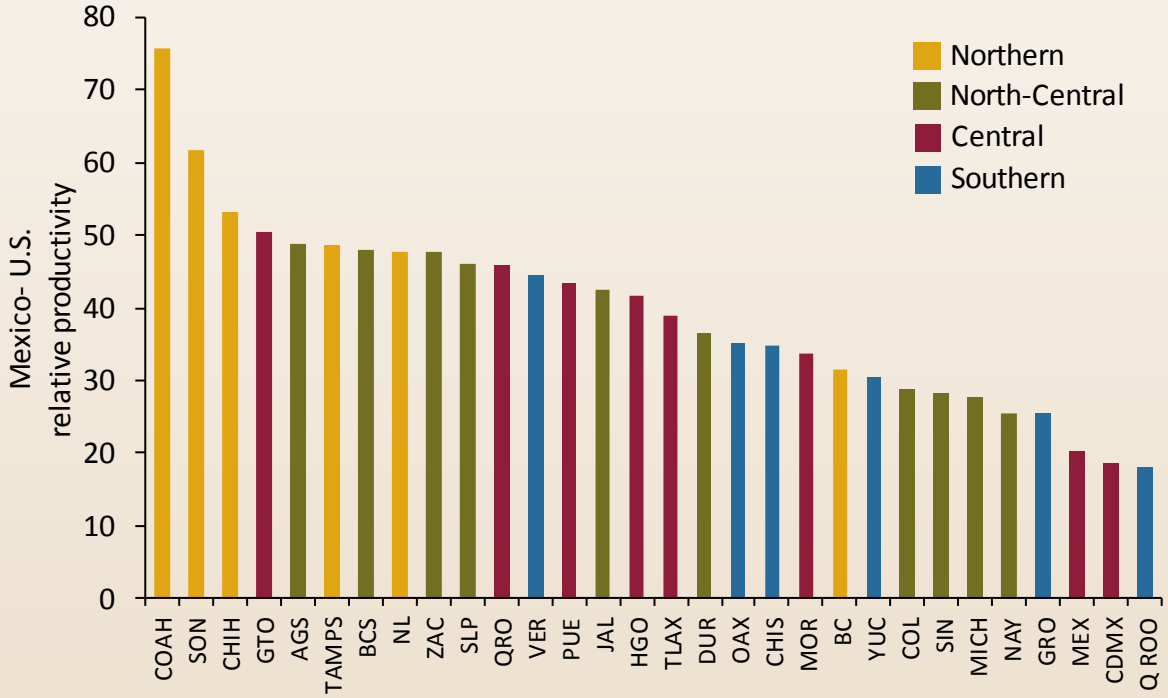
$$\widehat{GDP}_i^{MX} = F^{MX}(Luminosity\ by\ sector_i^{MX}, Population_i^{MX})$$

Productivity by unit of luminosity relative to that of the U.S. for each Mexican state is given by:

$$d_i = \frac{\widehat{GDP}_i^{MX}}{\widehat{GDP}_i^{MX_{US}}}$$

Productivity Level Relative to that of the U.S., by Unit of Luminosity

Percentage points

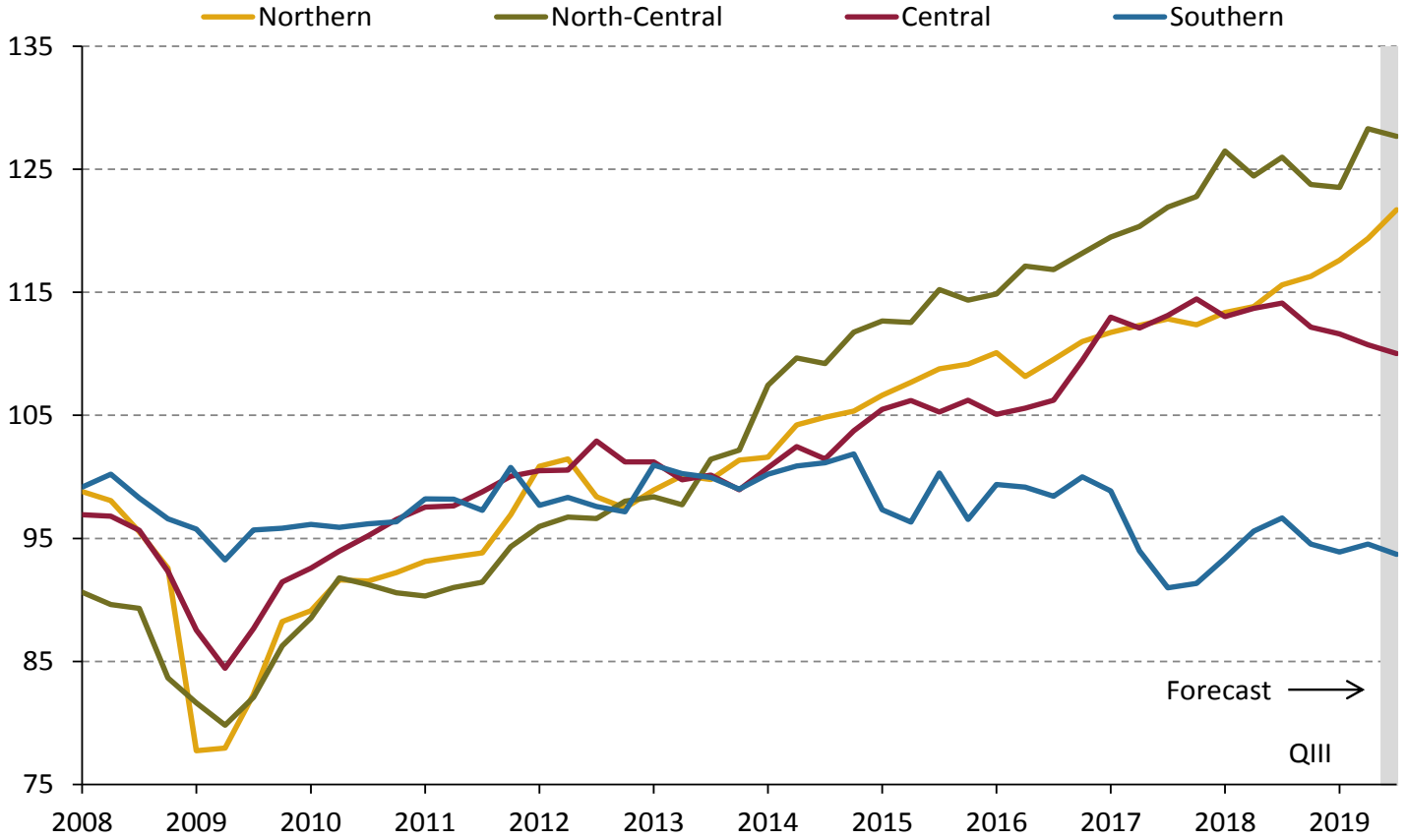


Source: Prepared by Banco de México with data from INEGI, BEA, the U.S. and NASA/NOAA-VIIRS.

In Q3 manufacturing activity is estimated to have continued expanding in the Northern region. In contrast, in the Central and Southern regions, manufacturing activity is expected to have contracted at the margin.

Regional Manufacturing Indicator

Index 2013=100, quarterly average, s. a.



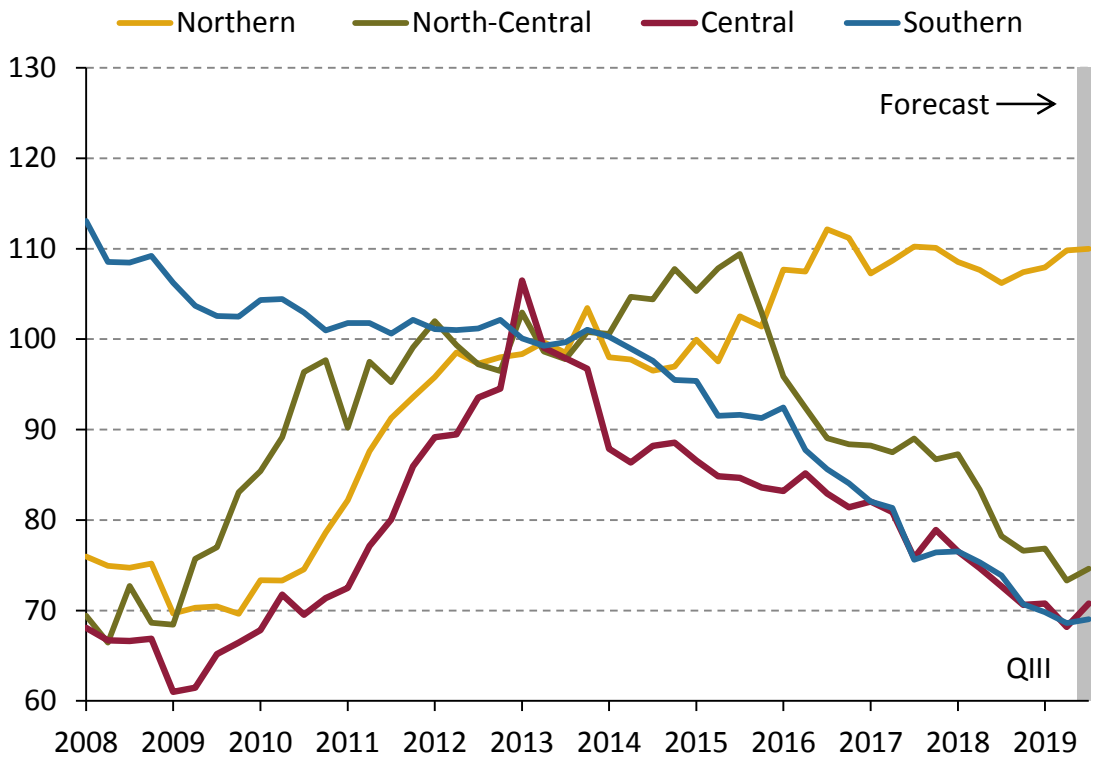
s. a. / Seasonally adjusted data.

Source: Estimated by Banco de México with seasonally adjusted series of the Monthly Indicator of Manufacturing Activity by State. INEGI.

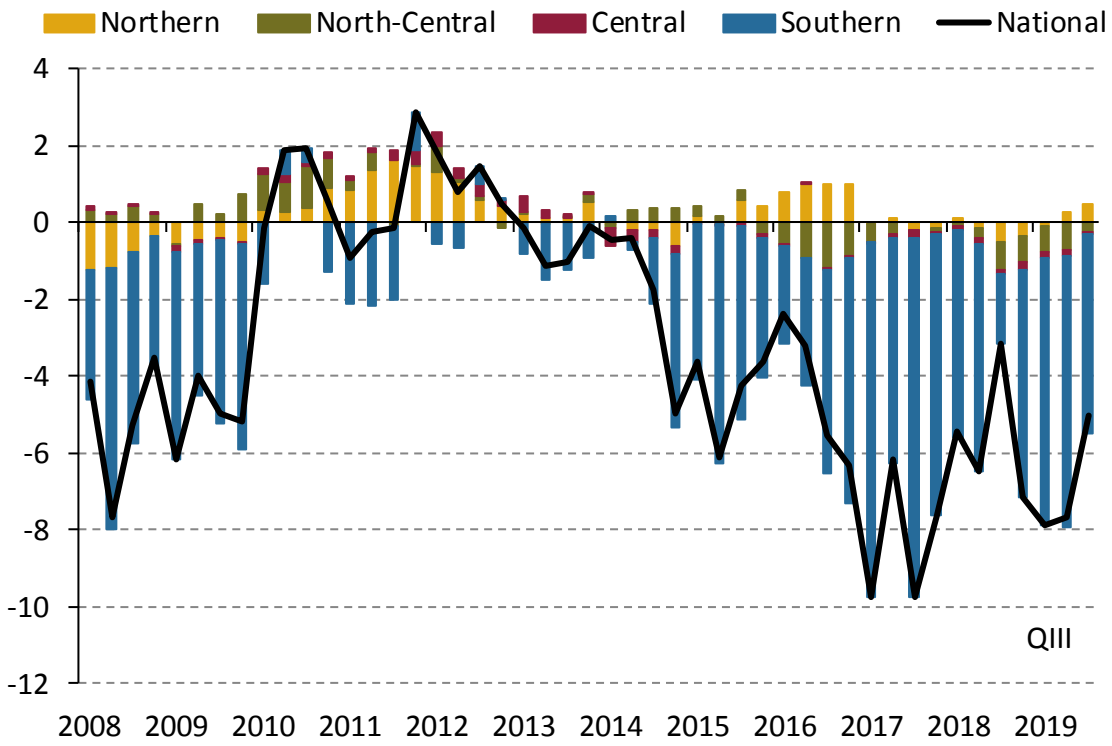
In Q3 2019, mining seems to have halted the downward trajectory it has been showing since 2014, and has even shown an incipient change of trend to the upside. Within mining activity, the item metal and non-metal minerals continued exhibiting a weak performance in most regions.

Regional Indicator of Mining, Quarrying, and Oil and Gas Extraction

Index 2013=100, quarterly average, s. a.



Regional Contribution to Annual Growth of Mining, percentage points, s. a.

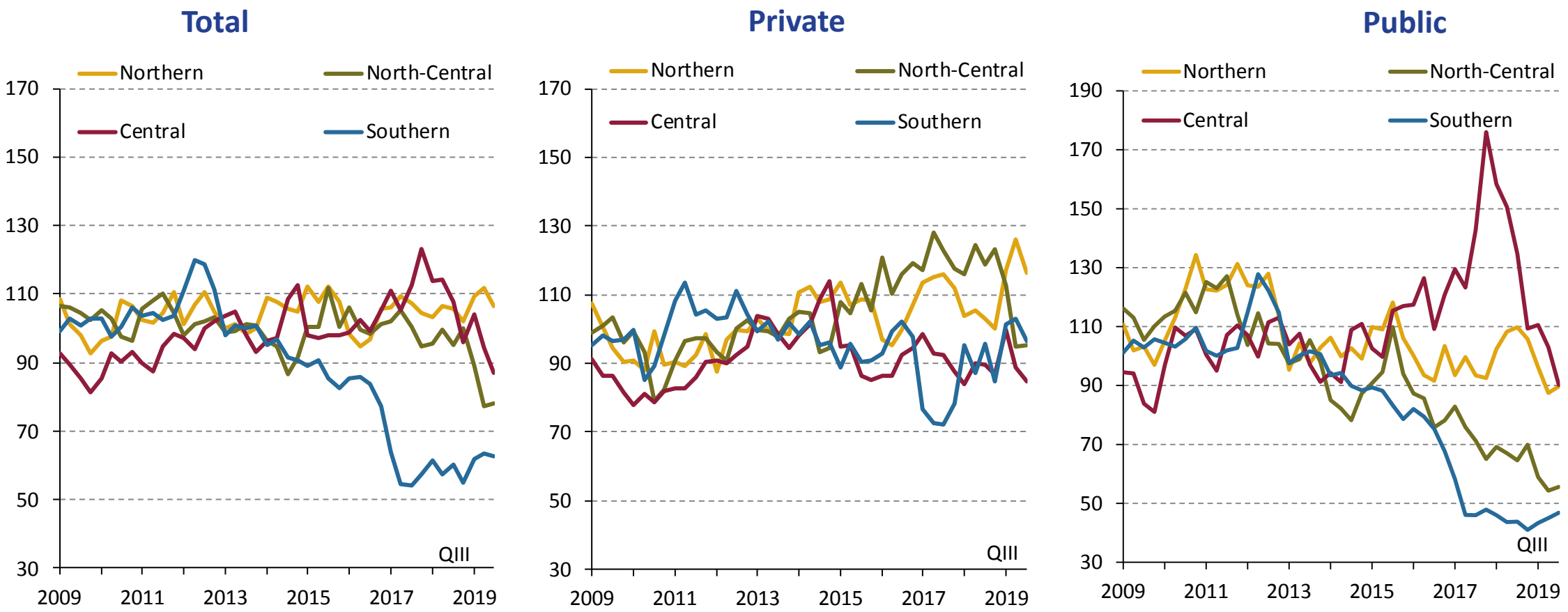


s. a. / Seasonally adjusted data.
Source: Estimated and seasonally adjusted by Banco de México with the series of the Monthly Indicator of Mining Activity by State and the Volume of Mining Production by Main States and Municipalities. INEGI.

During Q3 2019, the decreasing trend that construction has been registering since the beginning of 2018 intensified.

Real Value of Production in the Construction Industry by Region

Index 2013=100, quarterly average, s. a.



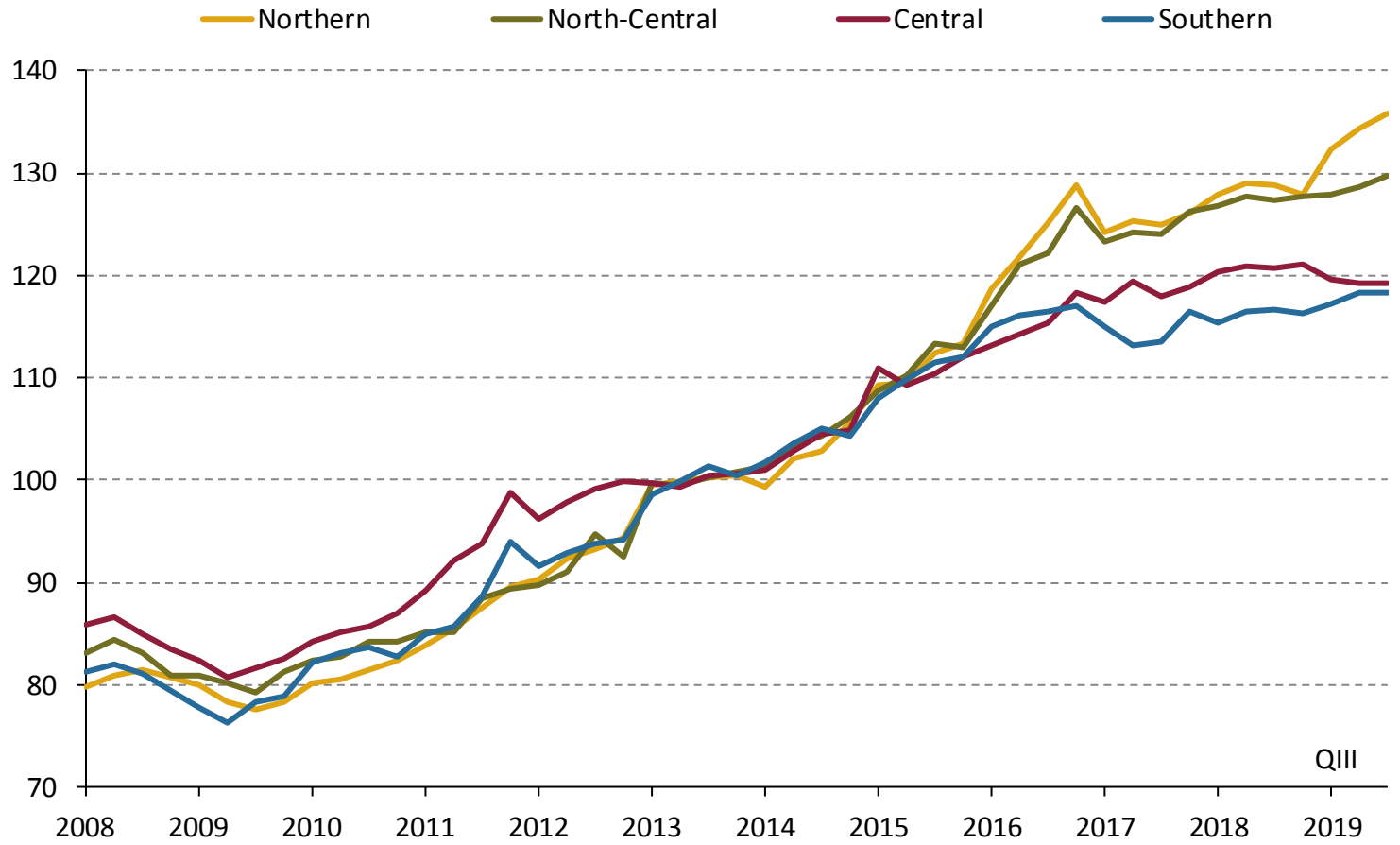
s. a. / Seasonally adjusted data.

Source: Prepared and seasonally adjusted by Banco de México with data from the National Survey of Construction Companies. INEGI.

Retail trade continued to expand in the Northern, North-Central and Southern regions, while in the Central one it remained at levels similar to those of Q2 2019, after having contracted during the first half of 2019.

Regional Trade Indicator

Index 2013=100, quarterly average, s. a.



s. a. / Seasonally adjusted figures.

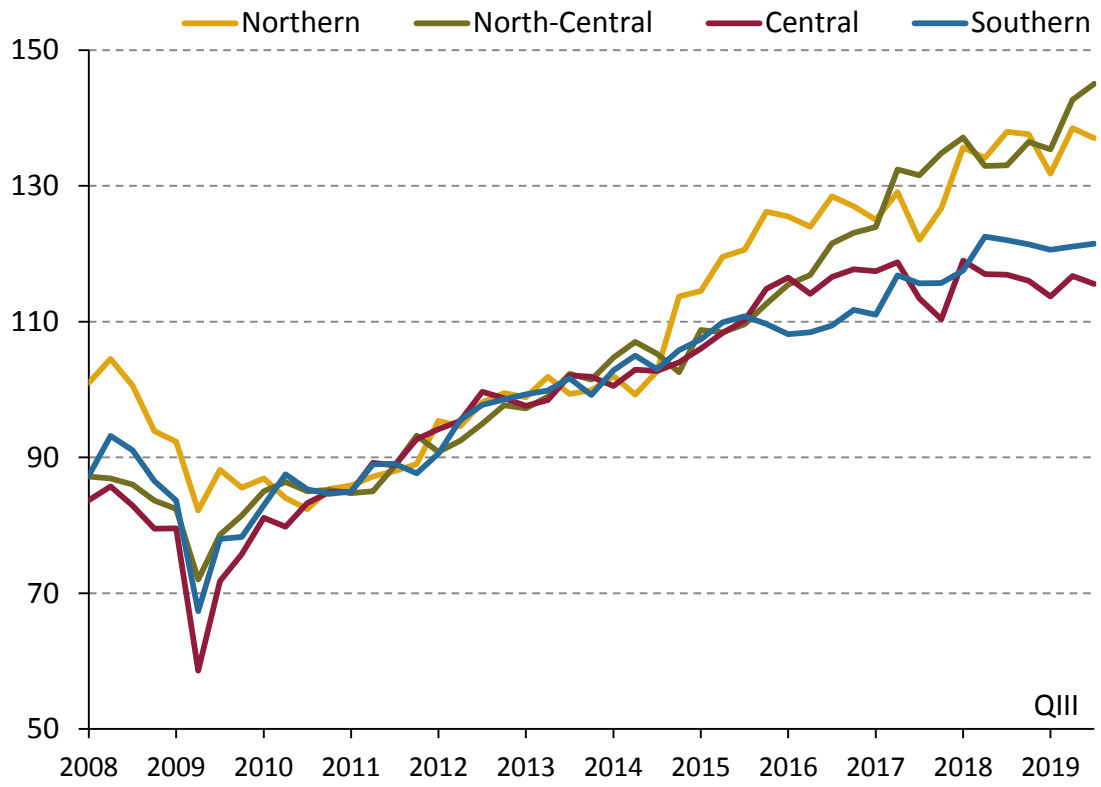
Source: Prepared and seasonally adjusted by Banco de México with the series of Revenues from Retailers' Supply of Goods and Services, by State. INEGI.

Tourism activity contracted in the Northern and Central regions in Q3 2019. The Southern region exhibited a slight increase in hotel occupancy and a drop in the inflow of passengers, while the North-Central region exhibited an expansion in both indicators, albeit at a lower rate than that observed in Q2.

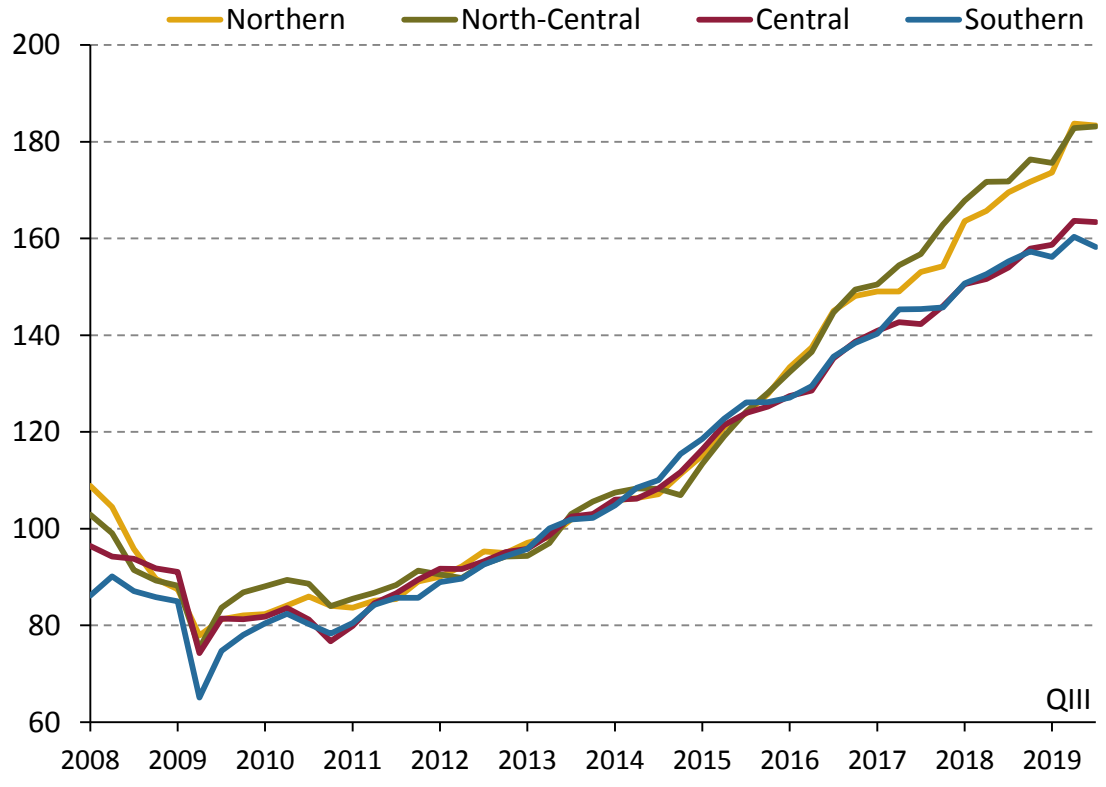
Regional Indicators of Tourism (Traveler Accommodation and Air Transportation)

Index 2013=100, quarterly average, s. a.

Hotel Occupancy



Inflow of Passengers to Airports



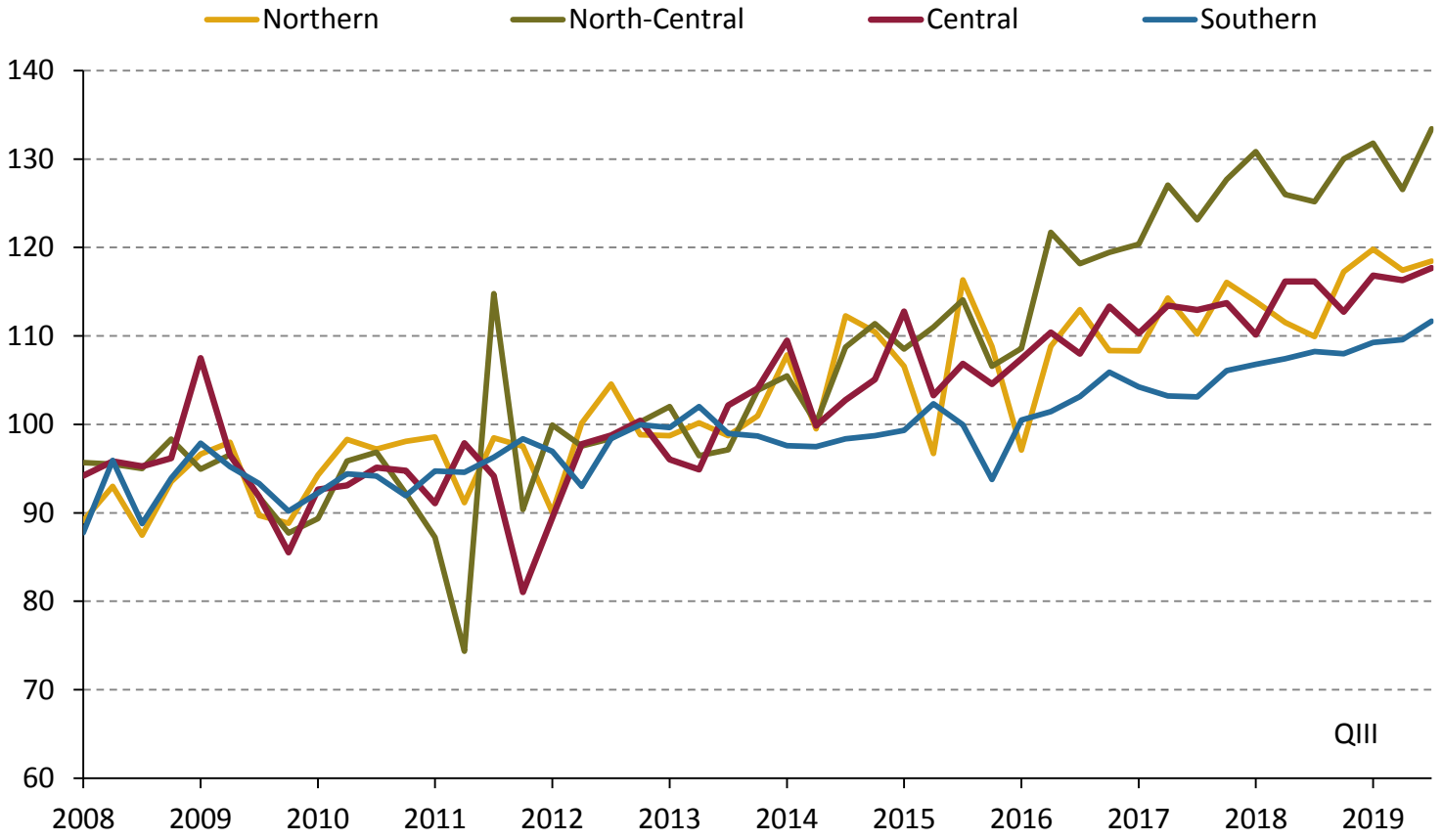
s. a. / Seasonally adjusted figures.

Source: Prepared and seasonally adjusted by Banco de México with data from the Mexican Secretariat of Tourism and the state-owned Company Airport and Auxiliary Services (ASA; for its acronym in Spanish).

The agricultural and livestock product industry expanded in all Mexican regions, after having decreased in Q2 2019.

Index of Regional Agricultural and Livestock Product Production

Index 2013=100, quarterly average, s. a.



s. a. / Seasonally adjusted data.

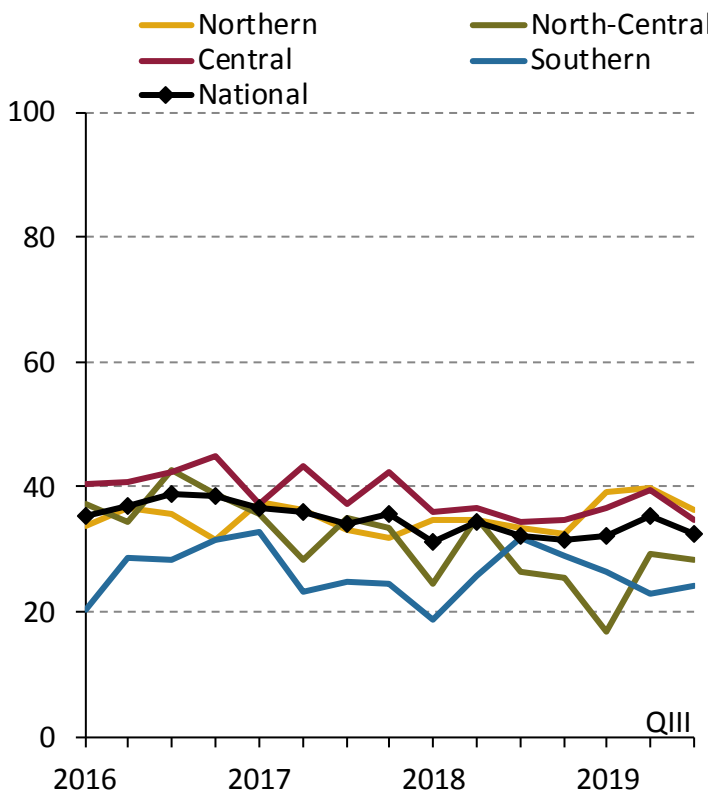
Source: Estimated and seasonally adjusted by Banco de México based on data from the Agricultural and Fisheries information Service (SIAP, for its acronym in Spanish). Unlike GDP estimates, this indicator excludes information on the value generated by land cultivation and approximates a measurement of the gross production value, rather than a measurement of the added value generated in the sector.

The share of firms that resorted to financing their activities through commercial banks contracted in all regions, except for the Southern one. The share of firms that resorted to financing with own resources expanded in all regions, except for the North-Central one, where it continued contracting.

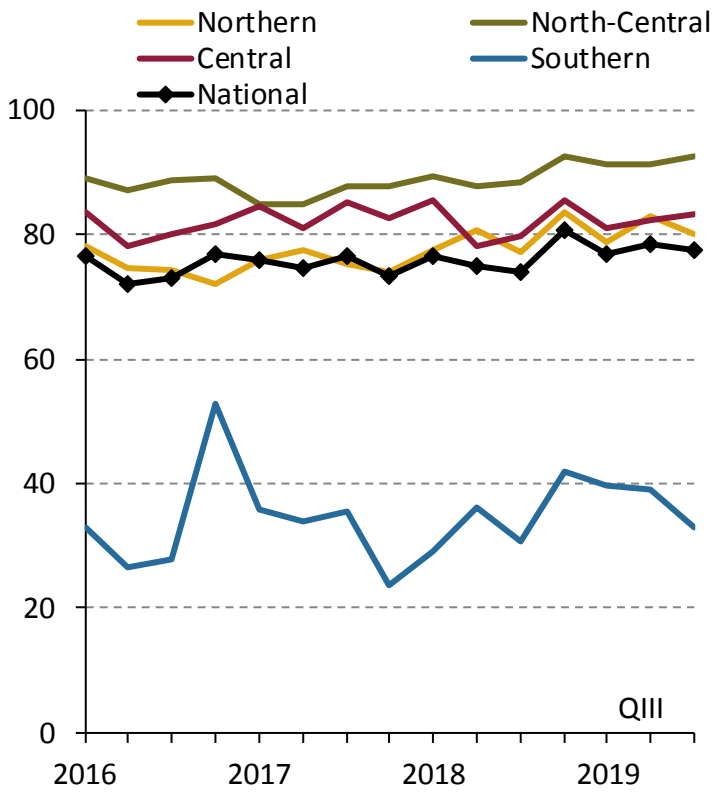
Main Sources of Financing by Firms in Q3

Percent of businesses that used each source of financing

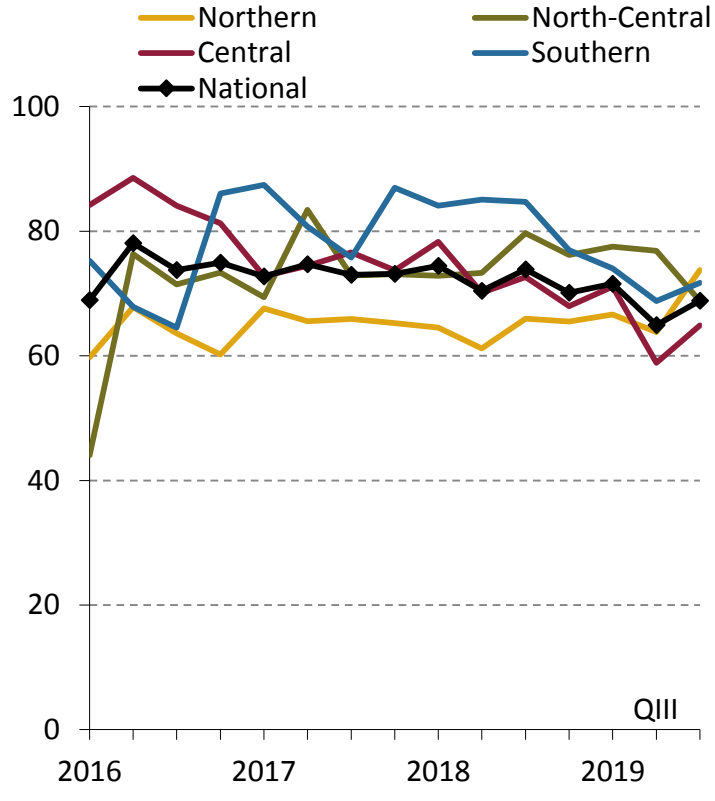
Commercial banks



Suppliers



Own resources

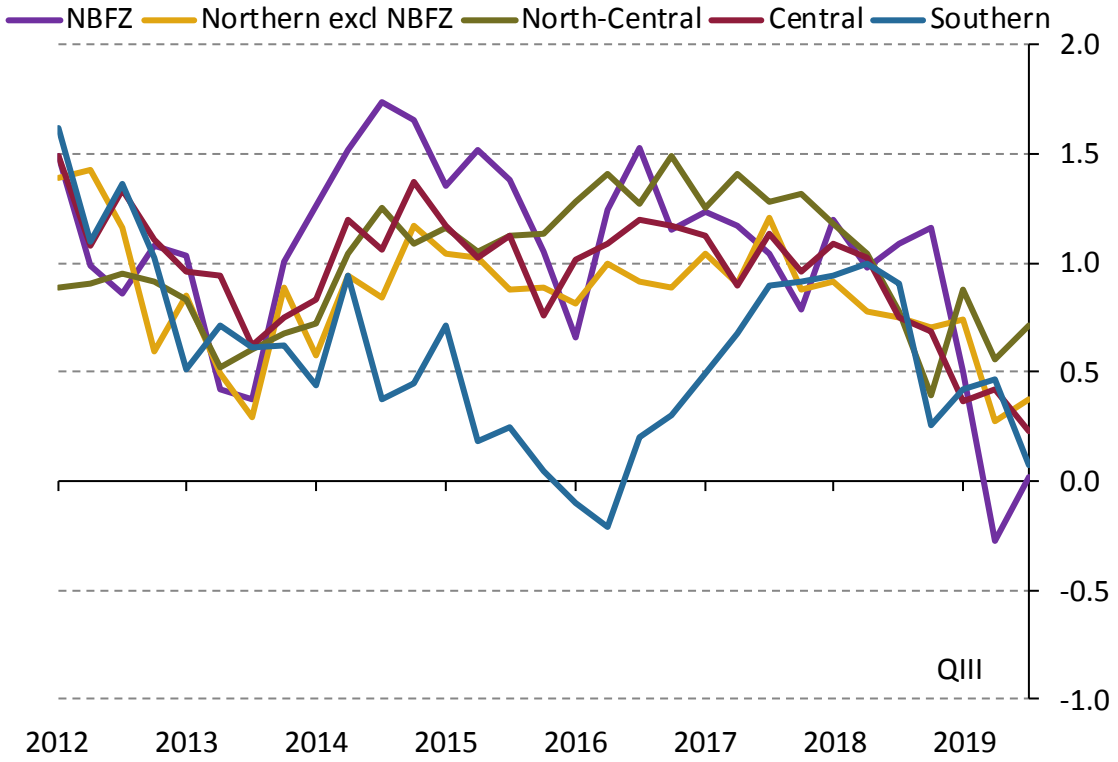


Source: Banco de México.

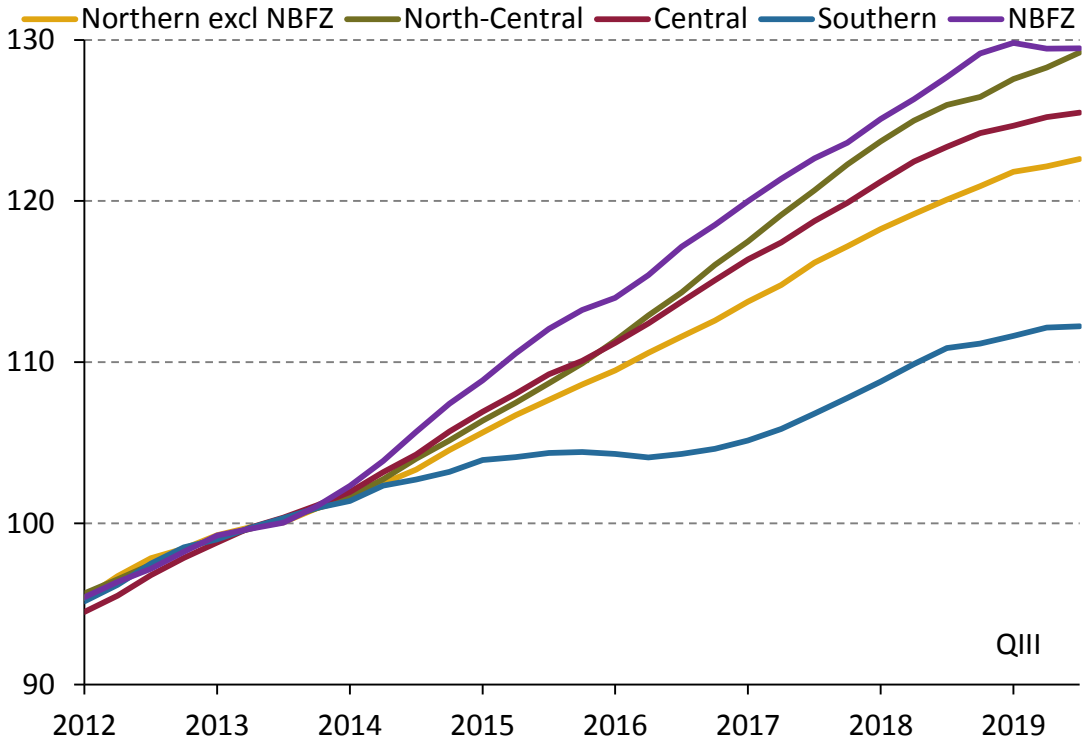
In Q3 2019, the growth rate of newly created IMSS-insured jobs continued to decelerate. In this respect, in all regions the quarterly rate of change is lower than that observed in early 2018, in particular in the Northern Border Free Zone (NBFZ), where it even registered negative levels.

Number of IMSS-insured Workers, s. a. 1/

Quarterly change, percent



Index 2013=100

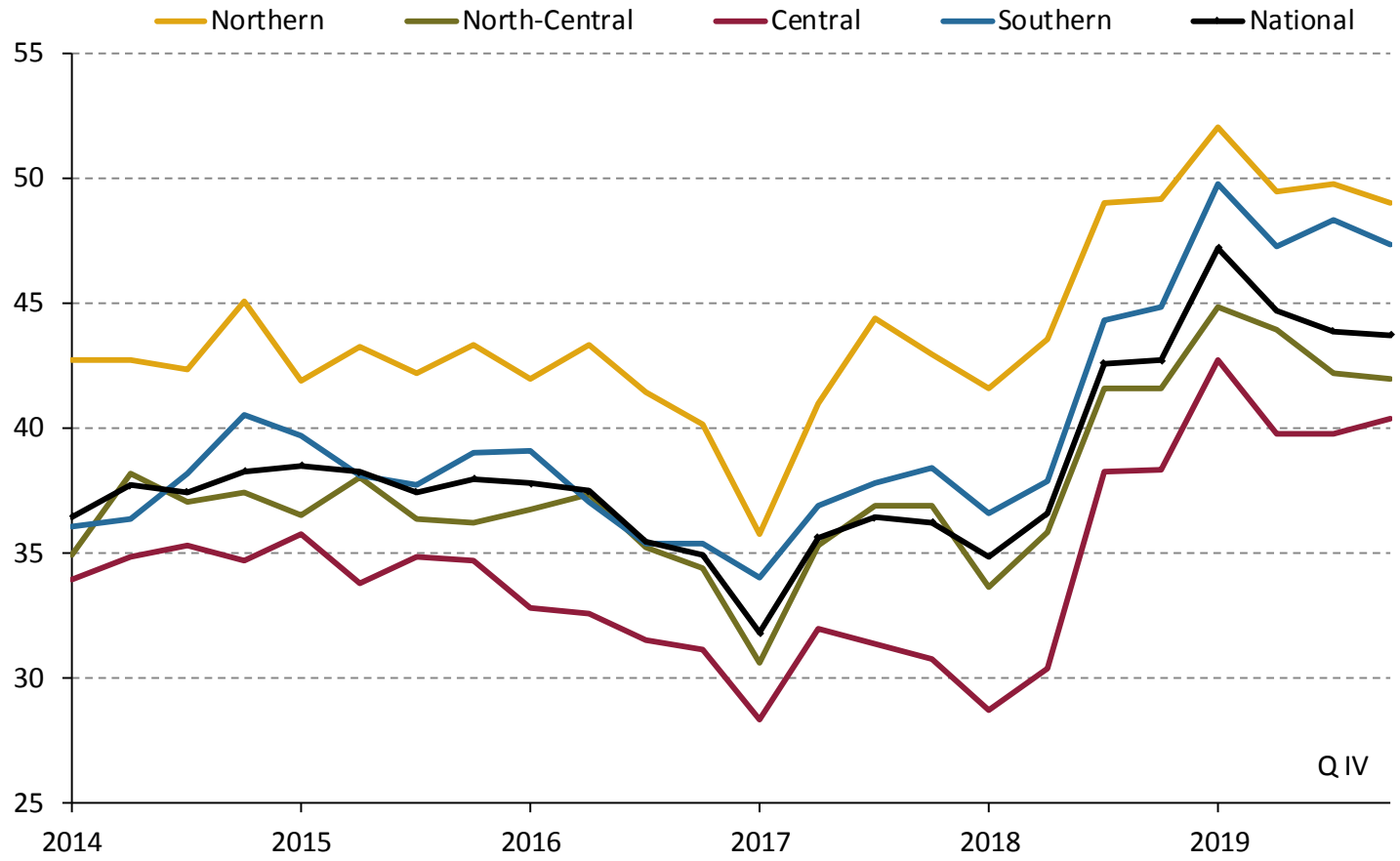


s. a. / Seasonally adjusted figures.
1/ Permanent and temporary jobs in urban areas.
Source: Estimated and seasonally adjusted by Banco de México with IMSS data.

The Consumer Confidence Index remained at relatively high levels during Q3 2019 in all regions.

Consumer Confidence [1/]

Balance of responses, s. a.

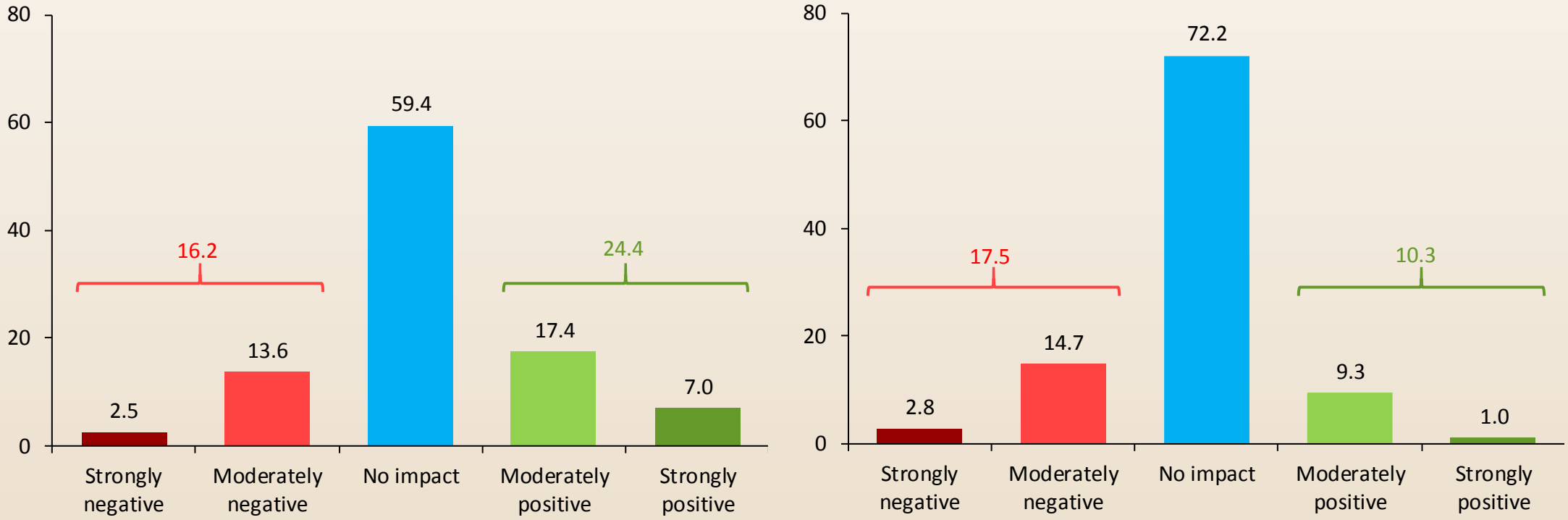


1/ This indicator's values in Q4 2019 correspond to the average of October and November.
s. a. / Seasonally adjusted figures.
Source: Prepared and seasonally adjusted by Banco de México with data from the series of the Consumer Confidence Index (INEGI) and Banco de México.

Risk Perception of Firms' Economic Activity in view of the China-US Trade Dispute

Average Subjective Probability of Impact on Production Caused by China-US Trade Conflict

Data in percent



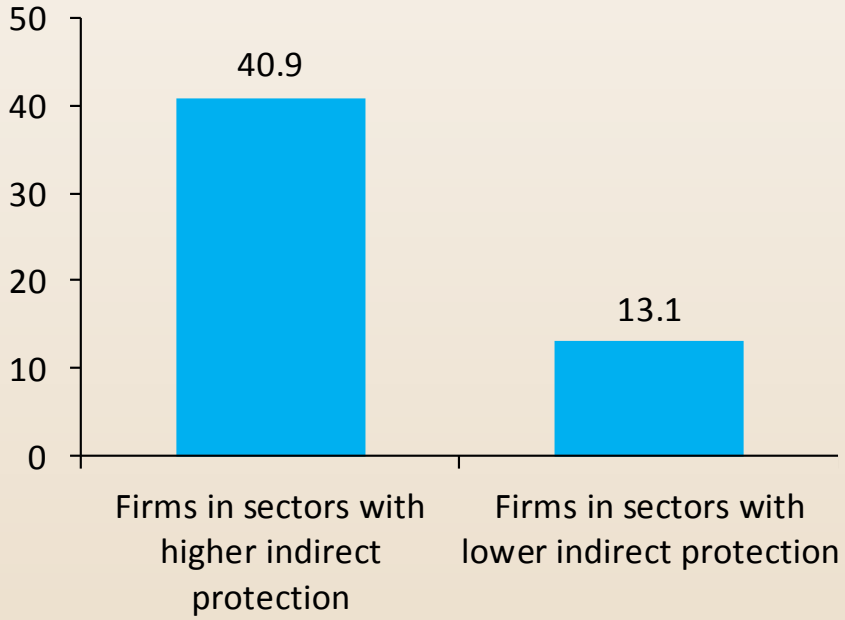
Note: The subjective probability of the impact by industry corresponds to the simple average of probability allocated to each scenario by business agents surveyed in each industry.
Source: Program of Surveys among Business Agents, conducted by Banco de México.

Risk Perception of Firms' Economic Activity in view of the China-US Trade Dispute

Average Subjective Probability of Positive Impact on Production Caused by China-US Trade Dispute

Opinion of exporting firms

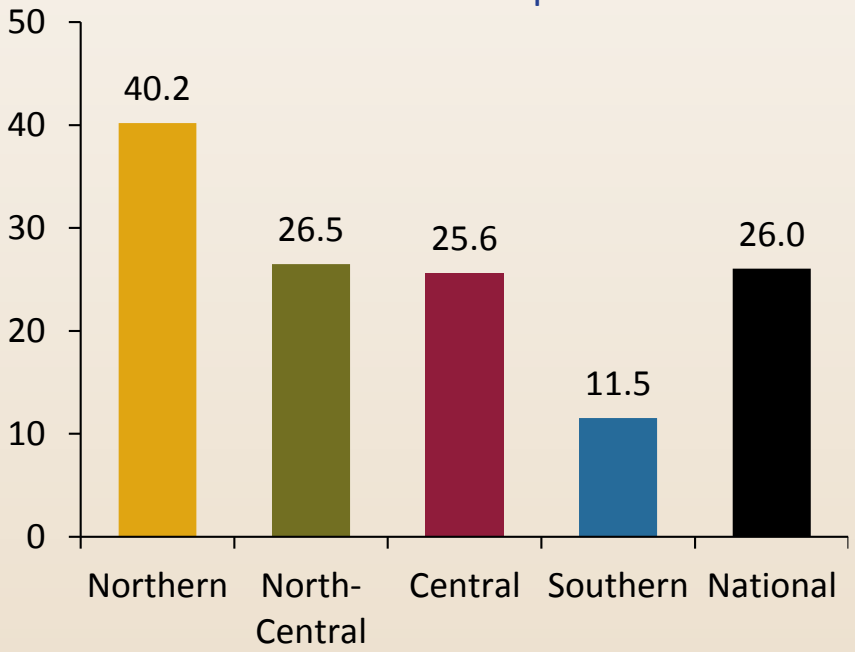
Data in percent



Firms that Reported a Positive Probability of a Positive Impact on Production, by Region

Share of total firms surveyed in the region

Data in percent



Source: Program of Surveys among Business Agents, realized by Banco de México.

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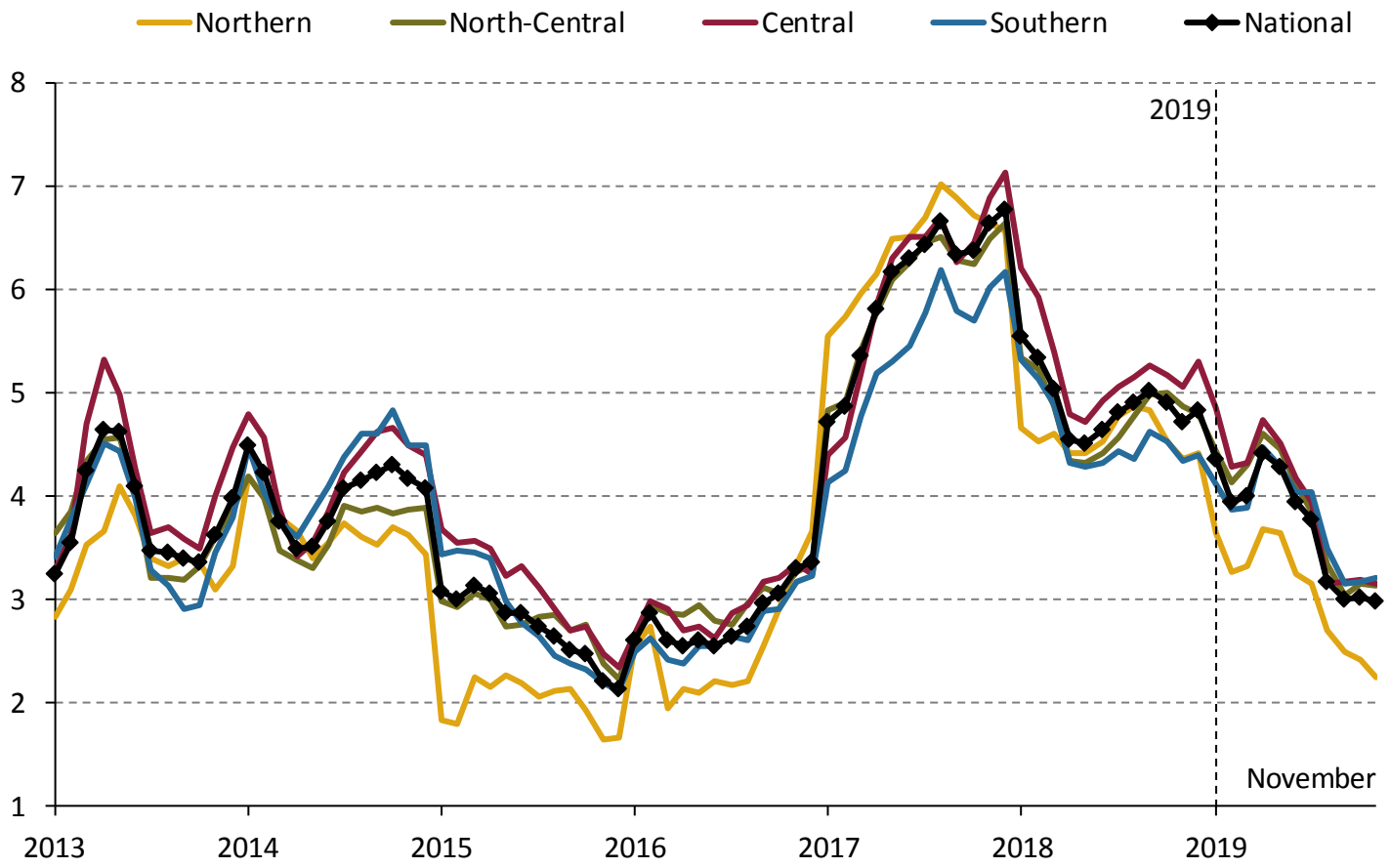
(based on data obtained between September 23 and October 17, 2019)

III. Final remarks

Headline inflation has been decreasing in all regions considered in this Report.

Annual Headline Inflation, by Region

Figures in percent

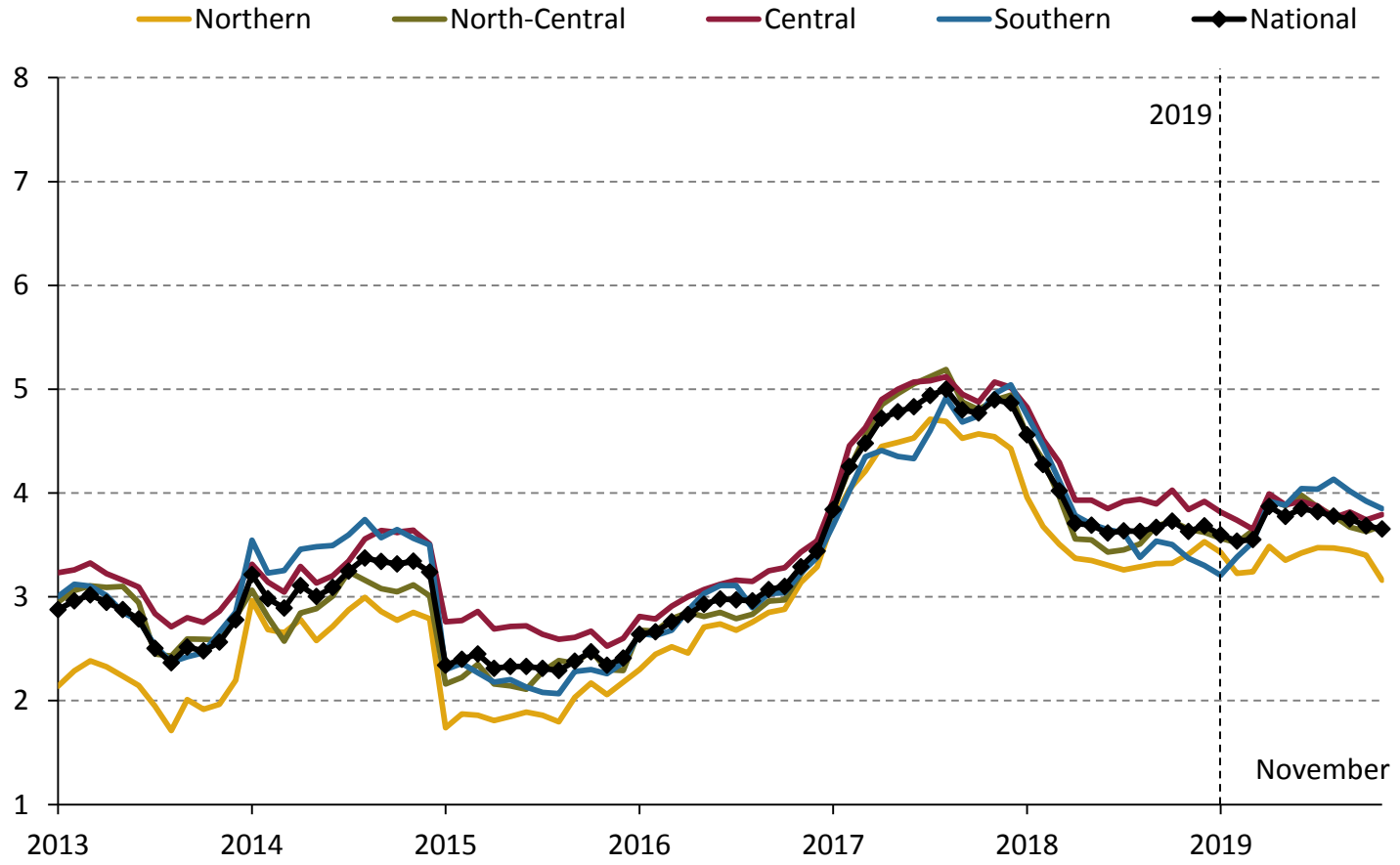


Source: Prepared by Banco de México with data from INEGI and Banco de México.

In all regions, annual core inflation continues to show persistence, although a certain decrease has started to be observed in most regions since the end of Q3.

Annual Core Inflation, by Region

Figures in percent

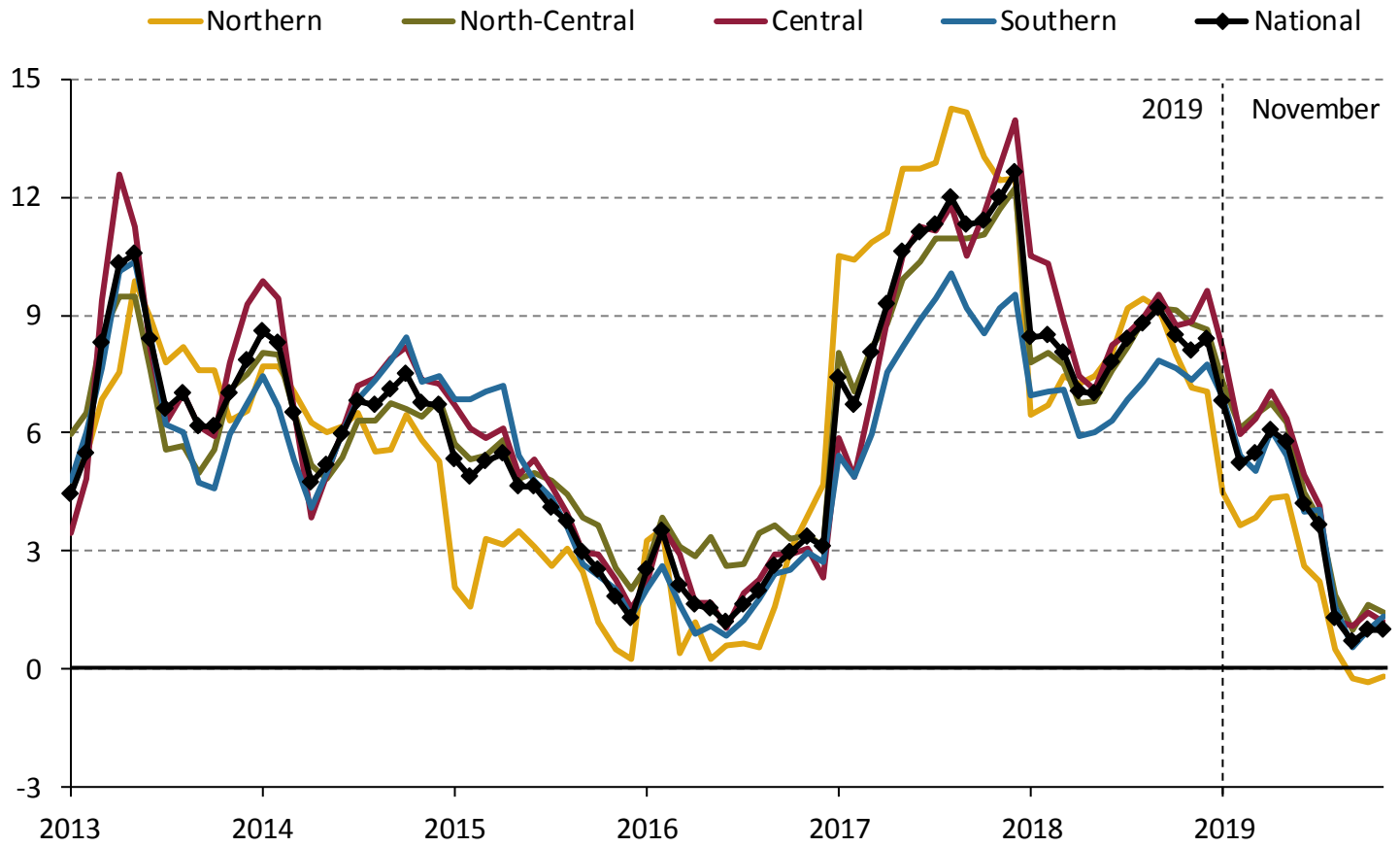


Source: Prepared by Banco de México with data from INEGI and Banco de México.

During Q3 2019, the reduction annual non-core inflation has been exhibiting in all regions intensified.

Annual Non-core Inflation, by Region

Figures in percent

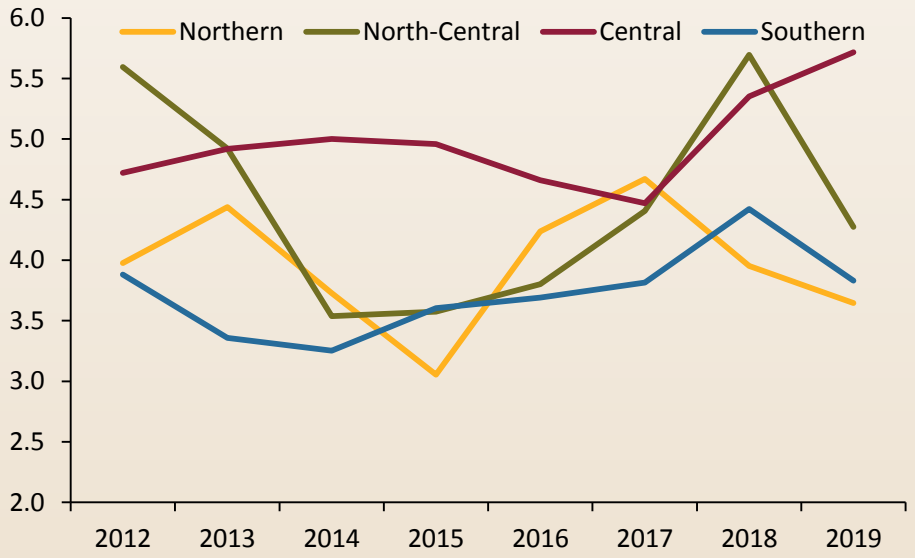


Source: Prepared by Banco de México with data from INEGI and Banco de México.

Recent Dynamics of The Price Index of Tuition Fees of Private Universities

Average Inflation of Private University Price Index, at a Regional Level [1/]

Percent



1/ Data as of November 2019.
Source: Prepared with data from INEGI.

The following simultaneous equations model was estimated:

$$\ln\left(P_{it}^{O}\right) = \alpha_i + \alpha_t + \alpha \ln\left(Q_{it}^{O}\right) + X_{it}^{O}\sigma + \epsilon_{it}^{O} \quad \textit{Supply}$$

$$\ln\left(P_{it}^{D}\right) = \beta_i + \beta_t - \beta \ln\left(Q_{it}^{D}\right) + X_{it}^{D}\delta + \epsilon_{it}^{D} \quad \textit{Demand}$$

Prices

Enrollment

$$\ln\left(P_{it}^{O}\right) = \ln\left(P_{it}^{D}\right) \quad \textit{Equilibrium condition}$$

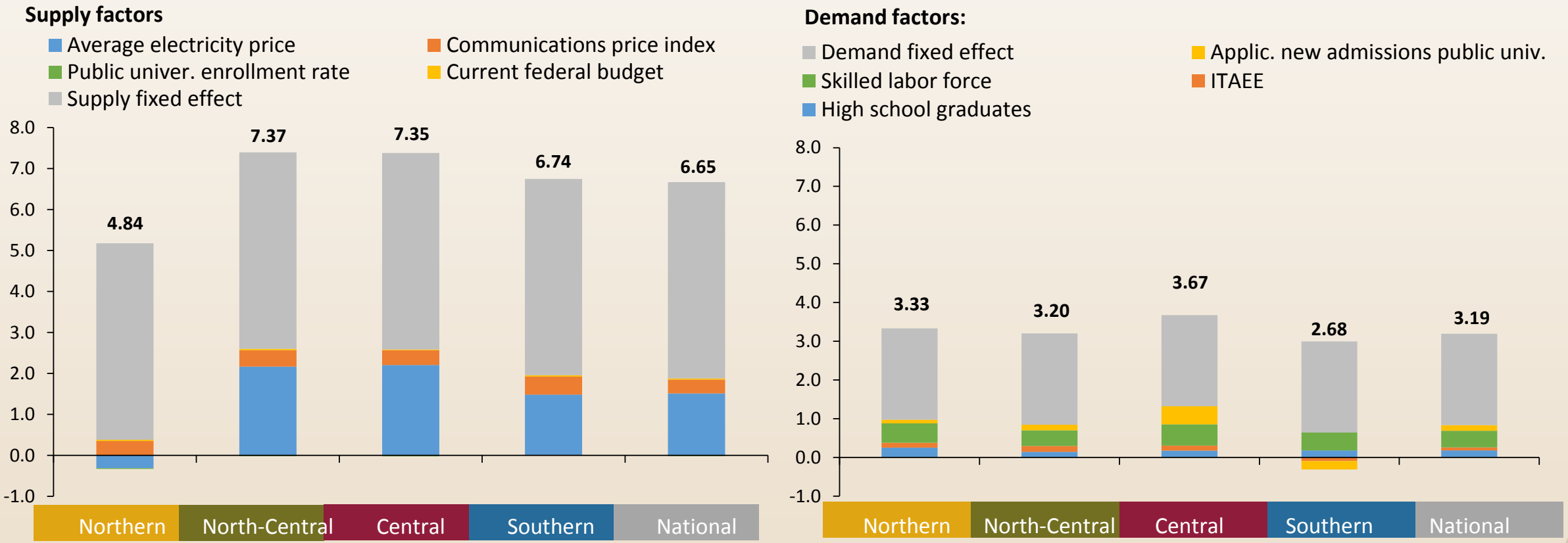
Recent Dynamics of The Price Index of Tuition Fees of Private Universities

Estimation of the Contribution of Supply and Demand Factors to the Evolution of Tuition Fees: Dec 2016 – Dec 2018

Percentage points

Supply

Demand



Source: Prepared with data from the National Association of Higher Education Universities and Institutions (ANUIES, for its acronym in Spanish), Federal Electricity Commission (CFE, for its acronym in Spanish), National Population Council (CONAPO, for its acronym in Spanish), INEGI, Mexican Social Security Institute (IMSS, for its acronym in Spanish), Ministry of Public Education, and Ordorika y Rodriguez (2019).

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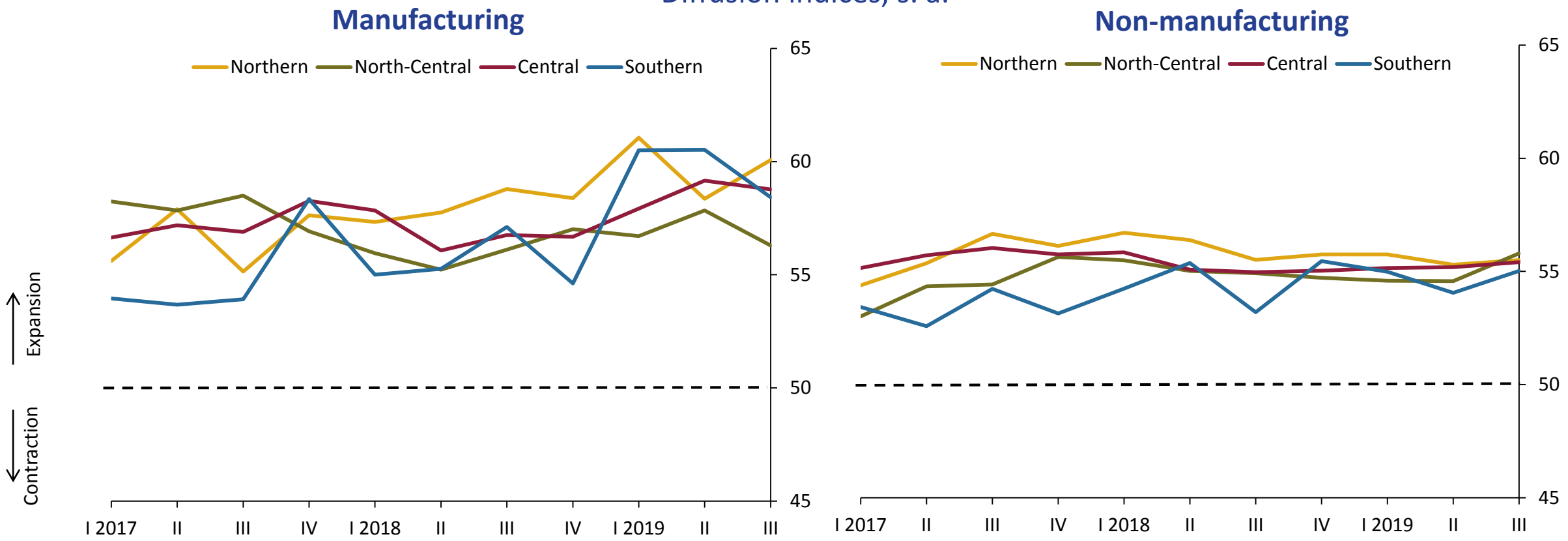
(based on data obtained between September 23 and October 17, 2019)

III. Final remarks

Regional indexes signal that both manufacturing and non-manufacturing activity will expand in the next 3 months. In the manufacturing sector, the signal of expansion strengthened in the Northern region and weakened in the rest of the regions. In the non-manufacturing sector, this signal strengthened in the North-Central and Southern regions and remained at the same level in the rest of regions.

Regional Index of Manufacturing and Non-manufacturing Orders: Activity Outlook, Next 3 Months

Diffusion indices, s. a.

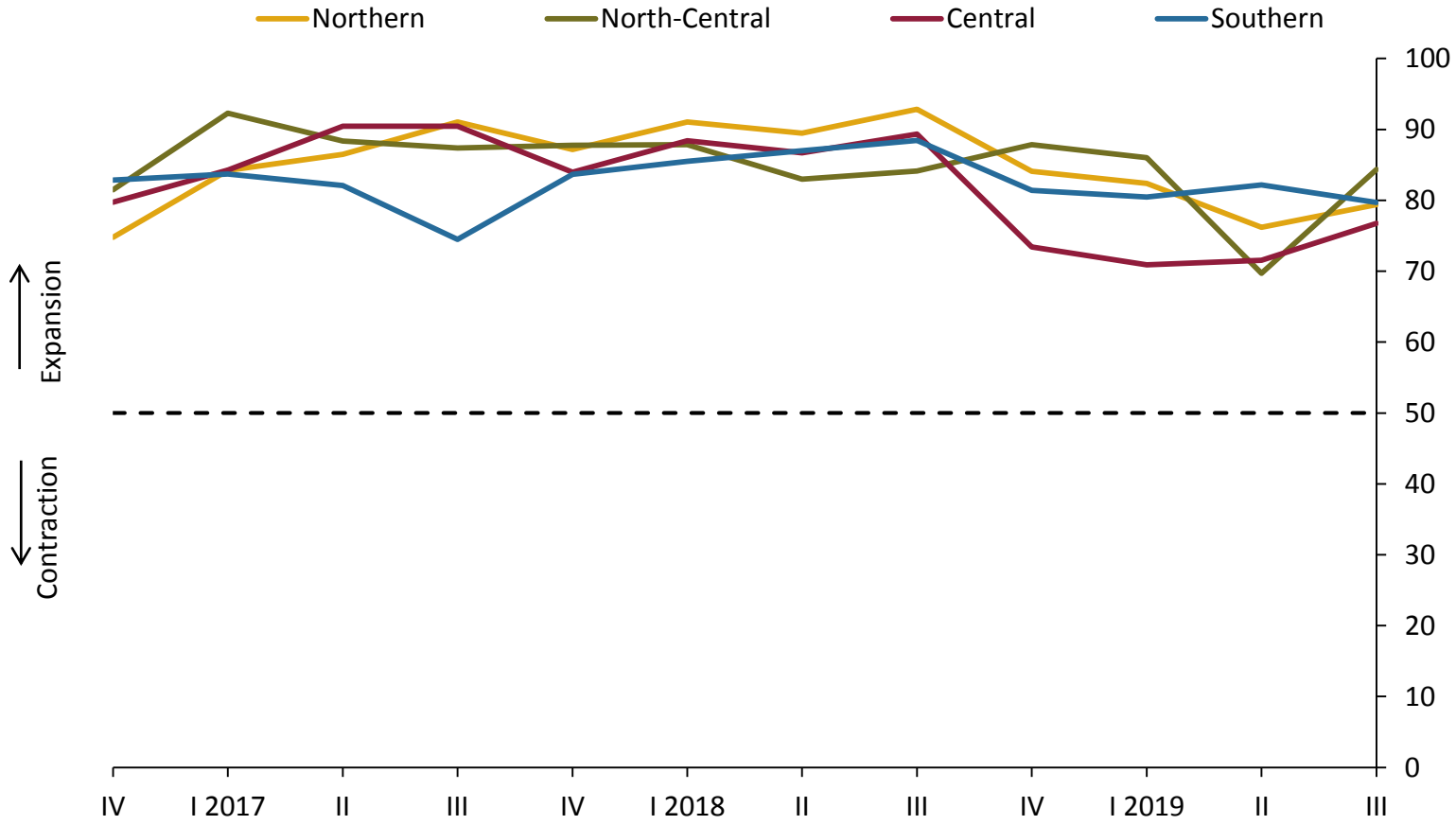


s. a. / Seasonally adjusted data.
Source: Banco de México.

For the next 12 months, business agents consulted in different Mexican regions anticipate a higher demand for own goods and services. It is worth noting that in all regions, except for the Northern-Central one, the signal remained lower than that observed during the same period of the previous year.

Business Agents' Expectations: Demand over Next 12 Months 1/

Diffusion indices

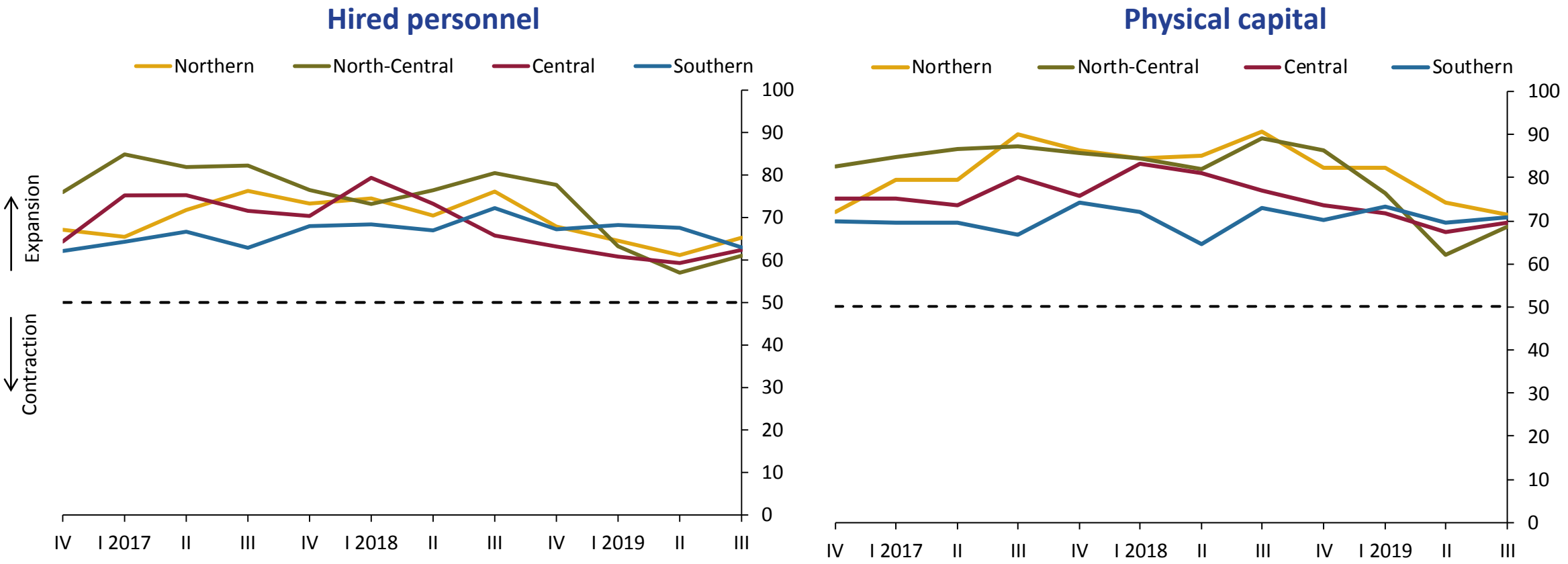


1/ Results obtained from responses to the question: "With respect to the volume of sales of your goods and services in the previous 12 months, how do you expect your sales volume to change in the next 12 months?", from interviews conducted by Banco de México.

Consistent with the expected growth in demand for own goods and services, business agents anticipate an increase of hired personnel and physical capital in all regional economies, although in both cases the signal remains lower than that observed in the same period of the previous year.

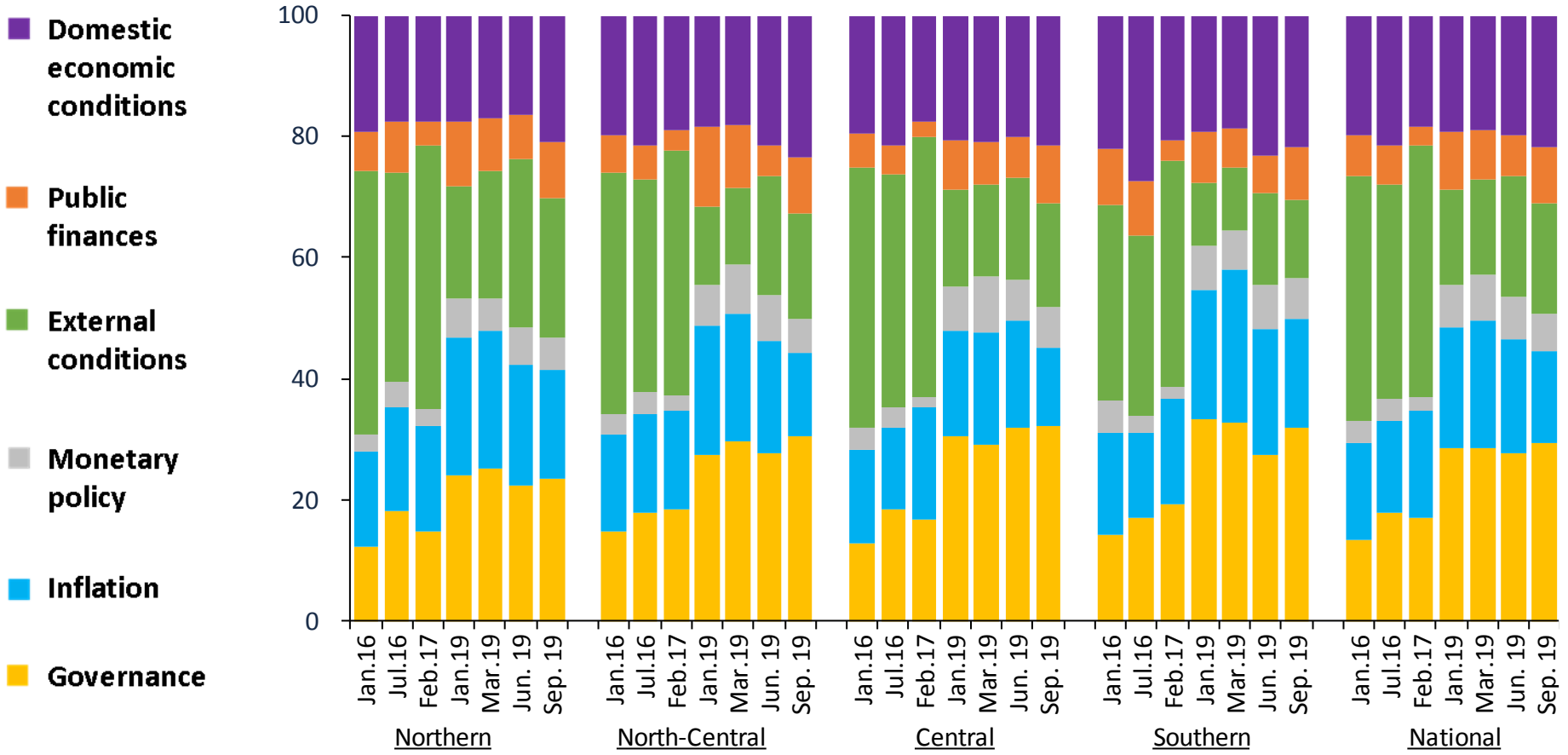
Business Agents' Expectations: Hired Personnel and Physical Capital Stock, Next 12 Months [1/]

Diffusion indices



1/ Results obtained from responses to questions: "With respect to the previous 12 months, how do you expect the total number of workers in your firm to change in the next 12 months?", and "With respect to your firm's investment in fixed assets during the previous 12 months, how do you expect investment levels to change in the following 12 months?", from interviews conducted by Banco de México.

Percentage Distribution of Business Agents' Responses when Interviewed about the Main Three Factors that Could Hinder Growth of Economic Activity in their States in the Next 6 Months [1/]



1/ Question: "Which do you consider to be the main three limiting factors for growth of economic activity in your state during the next six months?" This question is similar to that included in the questionnaire of the Survey among Private Sector Specialists.

Source: Banco de México.

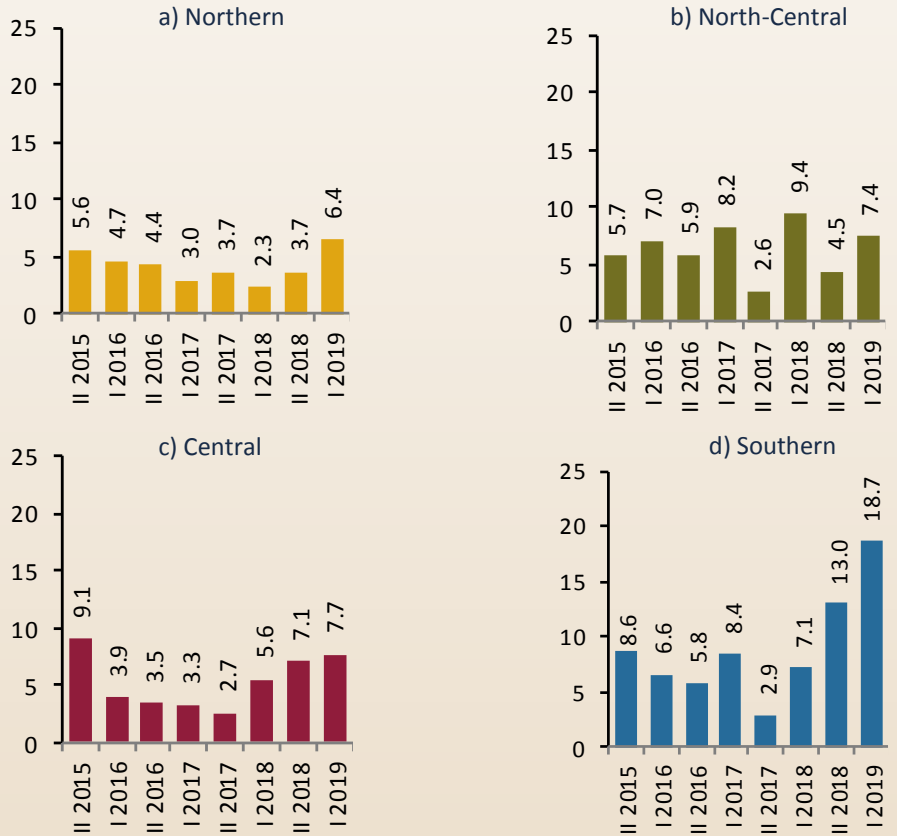
Extortion and Business Activity in Mexico's Regions

- In the opinion of business agents interviewed by Banco de México, public insecurity is one of the main factors limiting growth of regional economic activity.

- According to data collected among business agents interviewed by Banco de México, an upward trend in extortion reports has been observed in the Northern, Central and Southern regions since the beginning of 2018.

- In this context, the analysis in this box suggests that extortion may be negatively affecting activity of non-manufacturing companies, particularly in the Southern region.
  - ✓ A **logistic model with panel data** was estimated to assess the effect of having been a victim of extortion on a variable that indicates whether the company's productive activity was growing or not.
  - ✓ **In the case of the Southern region, the probability of a non-manufacturing company reporting an increase in activity goes from 0.47 when it has not been a victim of extortion to 0.27 when it has.**

Percentage of Firms that Reported having been a Target of Extortion 1/



1/ Percentage of responses to the question "During the reference semester, has the company been a victim of any of the following crime situations?" from interviews conducted by Banco de México.
Source: Prepared with data from Banco de México.

Business Agents' Opinion on Risks to Regional Economic Activity (based on data collected between September 23 and October 17, 2019) 1/

Upward risks

- ✓ That both public and private investment is revamped.
- ✓ That the U.S. – Mexico – Canada agreement is ratified.

Downward risks

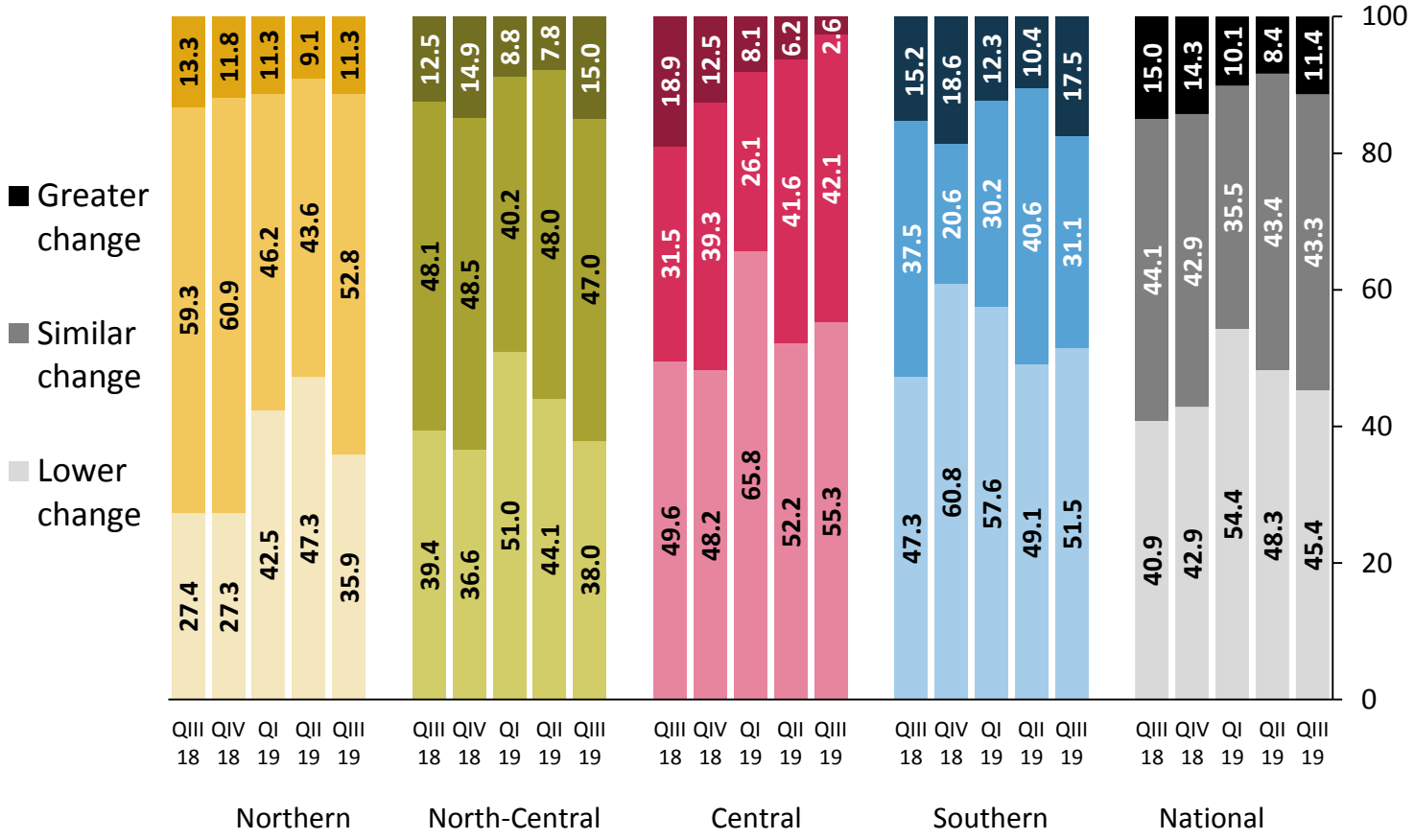
- ✓ That public insecurity increases.
- ✓ That the environment of domestic uncertainty that has been affecting investment persists.
- ✓ That the U.S. imposes tariffs on Mexican exports or that ratification of the U.S – Mexico – Canada agreement is extended.

1/ Results obtained from responses to the questions: "Which are the main two events/situations/facts that, if they occur, would boost economic performance in your state in the next 12 months?" and "Which are the main two events/situations/facts that, if they occur, would hinder economic growth in your state in the next 12 months?", from interviews conducted by Banco de México between September 23 and October 17, 2019.

Regarding sales prices of own goods and services, most business agents interviewed in different regions anticipate similar or lower annual changes as compared to those observed in the previous 12 months.

Business Agents' Expectations: Annual Change of Sales Prices, Next 12 Months [1/]

Percentage of responses

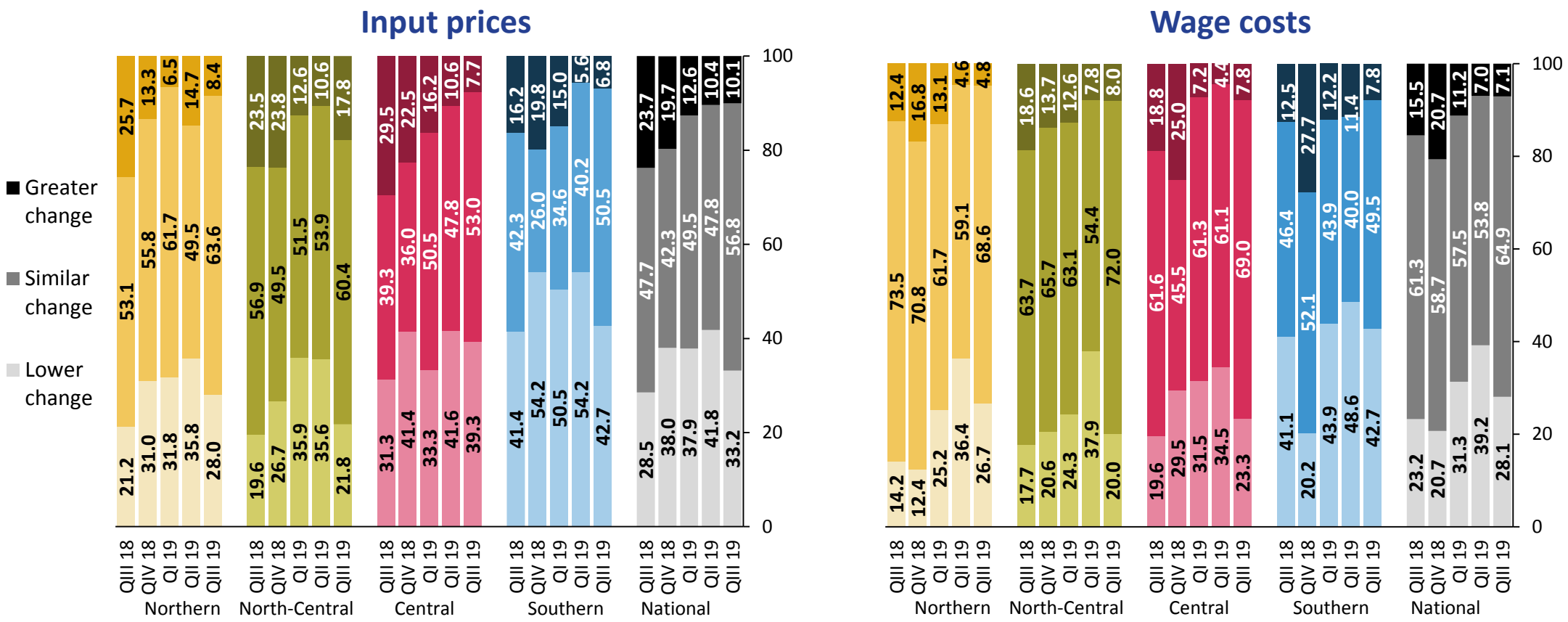


1/ Results obtained from responses to the question: "With respect to the previous 12 months, how do you expect sales prices in your sector to change over the next 12 months?", from interviews conducted by Banco de México.

Most business agents interviewed in all regions expect input prices and wage costs to grow at similar growth rates, as compared to those observed in the previous 12 months.

Business Agents' Expectations: Annual Change of Input Prices and Wage Costs, Next 12 Months [1/]

Percentage of responses



1/ Results obtained from responses to the question: "With respect to the previous 12 months, how do you anticipate the change in input prices (goods and services) used in your sector to be for the next 12 months?", and "With respect to the previous 12 months, how do you anticipate the change in wages of workers in your sector to be in the next 12 months?", from interviews conducted by Banco de México.

Outline

I. Regional Economic Report

II. Results July – September 2019

A. Economic activity

B. Inflation

C. Economic outlook

(based on data obtained between September 23 and October 17, 2019)

III. Final remarks

Final remarks

- In an environment of economic weakness and marked external and domestic uncertainty, the unfavorable performance that investment has been exhibiting for several years, and which intensified since the beginning of 2018, stands out.
- Such performance has been reflected in lower growth of regional economic activity in the short term, and may lead to lesser growth of regions in the medium and long term.
- It is therefore necessary to foster the recovery of investment through a public policy agenda that contributes to generate an environment of certainty, strengthens the business climate, and continues to reinforce the macroeconomic framework.
- Specifically, the structural and institutional setbacks that have prevented these economies from attaining higher regional potential growth must be corrected. This would promote capital accumulation and productivity growth, particularly in the regions that lag behind the most or that are more exposed to the prevailing adverse and complex international environment.



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December 2019

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