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Mexico Banking Outlook

JANUARY 2016 | MEXICO UNIT

01
Loans and deposits are recovering due to economic factors. Maintaining the dynamic would require support from the structural components of the economy

02
Analysis of the solvency of local governments, companies and households shows no evidence of systemic risk

03
Proposal for an efficient collections strategy to reduce arrears and improve the contact with cardholders

Content

Closing date: January 22, 2016

*** Responsibles of the section: Claudia Espinoza, Juan José Cervantes and Iván Solorzano.**
**** Responsible of the section: Alfonso Gurza.**

1. In summary

In 2015, both loans and deposits showed signs of recovery vs. 2014. Although part of the growth was due to the moderate improvement in economic growth during the year, their performance were mainly driven by uncommon factors: the progress in formal employment, the low inflation environment and the depreciation of the MXN all had a positive impact on households' disposable income, which enabled them to increase their bank deposits and thus to have access to more credit. The exchange rate also led to a revaluation of companies' debt portfolios, while the financial uncertainty increased their appetite for less volatile instruments. In the future, similar rates of growth will be sustainable as long as there are improvements in other structural components of the economy, such as investments and revenues.

Given the present economic scenario of increased uncertainty regarding certain financial variables, and the effect that they could have on the various economic agents, we consider convenient to analyse the financial solvency of local governments, companies and households. In this edition of ***Mexico Banking Outlook***, we present an analysis of the debt faced by the federative entities and the municipalities. Our findings reveal that local debt as a percentage of GDP has stabilised at levels still considered low. Nonetheless, the lack of flexibility in local public finance underlines the importance of tracking these obligations. The new regulatory framework will help to achieve a responsible and transparent management of local financing.

In the case of companies, we study the evolution of their foreign currency-denominated debt and the effect the recent exchange-rate depreciation has had on it. We find that this effect does not imply any systemic risk, but we identify certain groups of companies which could be more vulnerable to scenarios of further depreciation. So far the problems that some companies are experiencing do not appear to be transferring to the Mexican banking sector, but in the future it will be important to count on more detailed published information that will enable us to monitor and quickly identify any further deterioration.

Regarding households, we analyse their financial balance (assets less liabilities) to determine their degree of financial stress. Although the majority of Mexican households have a healthy balance sheet and have the capacity to survive periods of financial instability, there are some that lack the necessary solidity to cope with shocks to either income or expenditure, mainly in the lower-income deciles.

Finally, we present a methodology to improve the collection process for credit cards. We consider that an efficient collection strategy for accounts which are overdue is very important for maintaining a healthy portfolio and improving the quality of cardholder contact.

2. Current Situation

2.a Commercial bank lending to the private sector: in 2015 the negative trend of 2014 reversed

2.a.1. Recent evolution of performing loans and their components

In 2015 the performing loans granted by commercial banks to the private sector recovered vs. their performance during 2014, with an increase in real terms in November of 10.6% vs. the same month in 2014, which was also the strongest growth observed since June 2012 (11.2%). Between January and November 2015, this credit expanded at a real annual average rate of 8.0%, almost double the average rate of growth during 2014 as a whole (4.2%). The strongest momentum was during the second half of the year, when average growth reached 9.6% (from July to November), while in the first half average real growth reached 6.7%.

The three principal lending segments (consumer, housing and corporates) performed similarly, with a marked recovery over the year, principally in the second half (Chart 2.a.1). In consumer and residential lending, the strongest real growth in the first 11 months of 2015 was observed in November (7.7% and 10.6% a year respectively), while loans to corporates were at their strongest in September (14.1%). Loans to corporates was the segment that grew the most, with a real average annual growth rate from January to November of 10.1%, the highest in this period since 2008, when it hit 24.1%. The second-fastest growing was housing credit, with a real average annual growth rate of 8.4%, the highest in this period since 2010 (10.0%). Finally, consumer credit posted real average annual growth of 4.1%. Although this segment performed better than in 2014 (3.7% in January to November), growth was still below the levels observed in previous years.

Figure 2.a.1
Performing commercial bank lending to the private sector, total and by segment
Real annual growth rate, %

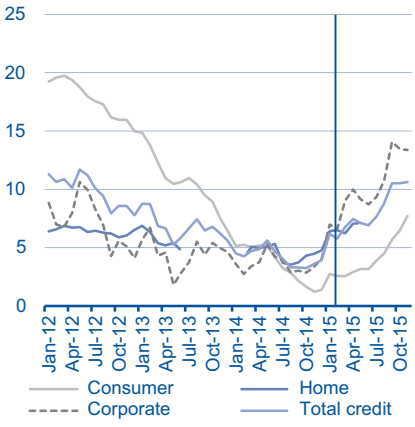


Figure 2.a.2
Performing commercial bank lending to the private sector. Contribution to growth by segment, %

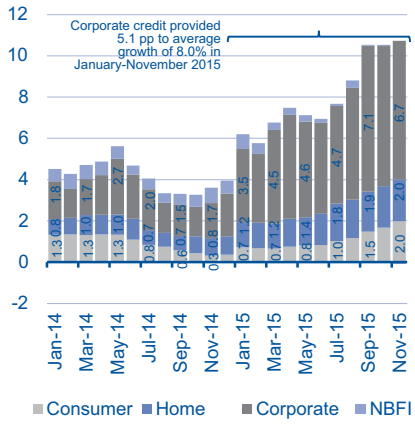
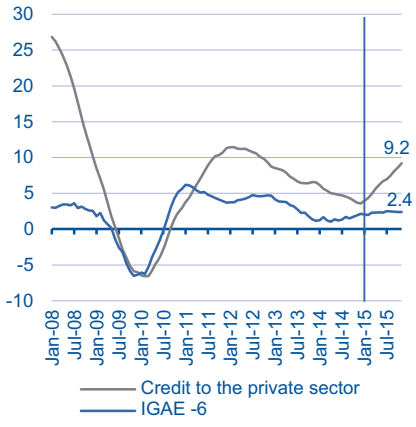


Figure 2.a.3
Performing commercial bank lending to the private sector and IGAE.
Real annual growth rate (6MMA), %



Source: BBVA Research with the central bank and INEGI data

In terms of the contribution of each segment to total growth, in 2015 loans to corporates stood out with 5.1 percentage points (pp) of the 8.0% annual average total growth between January and November. This was followed by housing loans, with 1.6pp, and consumer credit with 1.1pp (Chart 2.a.2). These figures indicate that lending to corporates remains the principal engine of growth of bank lending to the private sector.

Historically, the performance of bank lending has been closely linked to that of economic activity. Chart 2.a.3 shows the six-month moving average of credit growth and the Global Indicator of Economic Activity (IGAE in its Spanish acronym) lagged by six months, and this shows their close relationship over time. We can also see than in 2015 the performance of credit was not entirely linked to economic growth, as there was greater momentum in the former. This suggests that there could be other factors besides economic activity which appear to be influencing the performance of bank credit to the private sector. As we will show below, it is very probable that such factors included currency depreciation and the possible substitution of foreign currency-denominated debt to local currency-denominated debt by Mexican companies. These helped to accelerate the rate of growth of the corporate lending book during 2015.

2.a.2. Corporate lending

At end-November, performing credits to corporates expanded at a real growth rate of 13.4%, practically the same as in October 2015 (13.5%) and four times faster than in November 2014 (3.4%). Thanks to the significant share in the balance of performing private-sector credit (51.6%), this segment made the highest contribution to growth (5.4pp to the total growth of the portfolio of 10.6% observed in November).

There was a favourable performance in all economic sectors of the accredited companies (Chart 2.a.4), especially in Manufacturing and Construction. In those sectors the negative trend of earlier years reversed: between January and November 2015 the former registered an average annual rate of growth of 12.6% vs. growth of 1.6% in the same period of 2014, while the latter expanded by 11.3%, compared to the 6.9% contraction registered the previous year. Meanwhile, the trend in the Services sector was also positive, although rates of growth were lower than in the other sectors (8.7% real annual average from January to November 2015). Even so, given the large share of this sector in the total credit to corporates (51.7%), it was the main driver of the momentum observed, contributing 5.3pp to the average growth of the corporate loan book of 10.1% during the period.

Figure 2.a.4
Bank lending to corporates, by sector of activity of accredited companies
Real annual growth rate, %

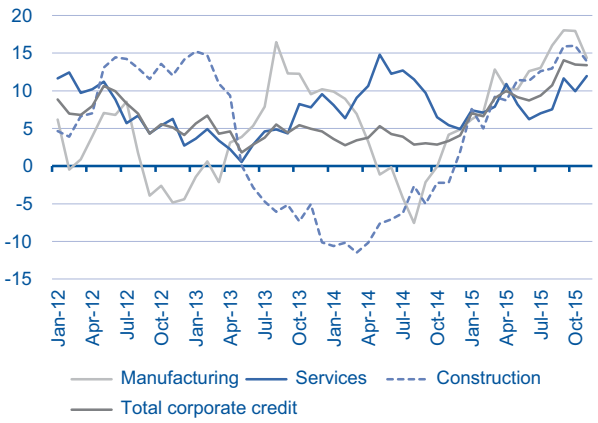
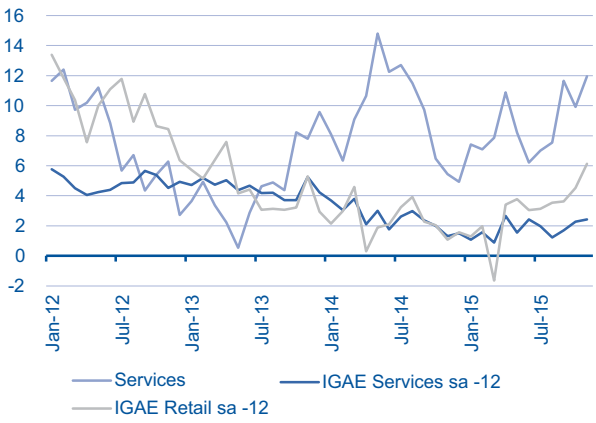


Figure 2.a.5
Lending to companies in the Services sector and IGAE Real annual growth rate, %



Source: BBVA Research with the central bank and INEGI data

The breakdown of the corporate loan book by economic sector allows us to compare their performance to that of those sectors in the context of Mexico's economic activity, which can be measured by the disaggregated IGAE by sector. Charts 2.a.5 to 2.a.7 show the evolution of the credit and the corresponding IGAE, which shows their close relationship, although lagging by several months. For example, the performance of lending to the Services sector follows a very similar trend to its respective IGAE and to that of the Trade sector, both with a 12-month lag (Chart 2.a.5). The same happens with the credit to the Manufacturing and Construction sectors, where performance closely follows the IGAE for these activities, with a six-month lag (Charts 2.a.6 y 2.a.7). Since the end of 2014, the IGAE of those sectors has growth faster than in previous months, and part of the increase in corporate lending could be explained by the improved performance of those sectors. However, we can also see that they have grown more slowly than lending, showing that the momentum of the different economic sectors is not the only engine of growth.

Figure 2.a.6
Credit to companies in the Manufacturing sector and IGAE
Real annual growth rate, %

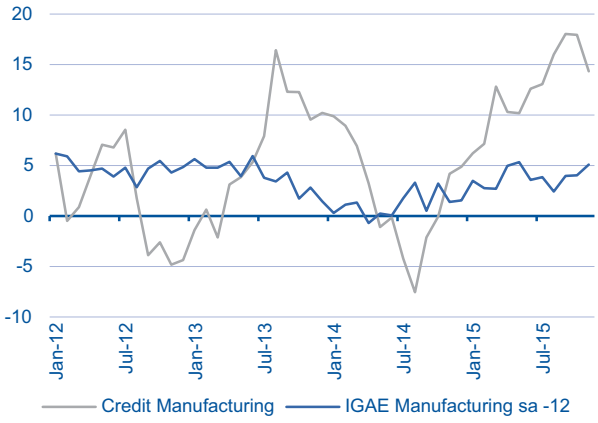
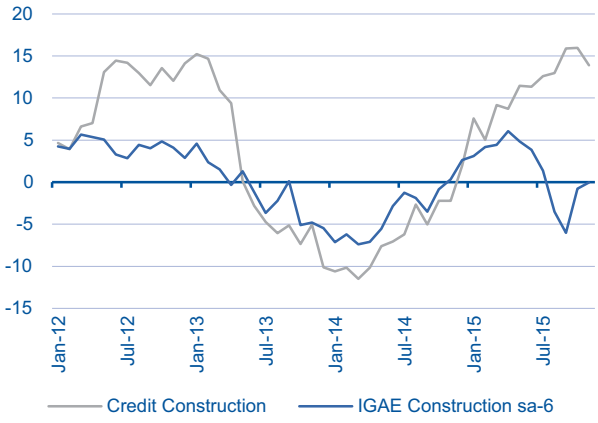


Figure 2.a.7
Credit to companies In the Construction sector and IGAE
Real annual growth rate, %



Source: BBVA Research with the central bank and INEGI data

One component of economic activity which historically has influenced the performance of lending to corporates is investment, although also with a certain lag. Chart 2.a.8 shows similar growth trajectories in corporate lending and the Gross Fixed Investment Index lagged by three months. Since the second half of 2014, there has been a significant recovery in investment, which rose from a zero average growth in 1H14 to 5.7% in 2H14. This improvement extended into the first half of 1H15, a performance which coincided with the expansion of credit until 3Q15. However, after 3Q15 the pace of growth in investment appears to have moderated, while credit growth has remained at high levels. The above reinforces the hypothesis that there could have been an additional factor driving the growth in lending to corporates during the year.

Figure 2.a.8
Lending to corporates and Gross Fixed Investment
Real annual growth rate, %

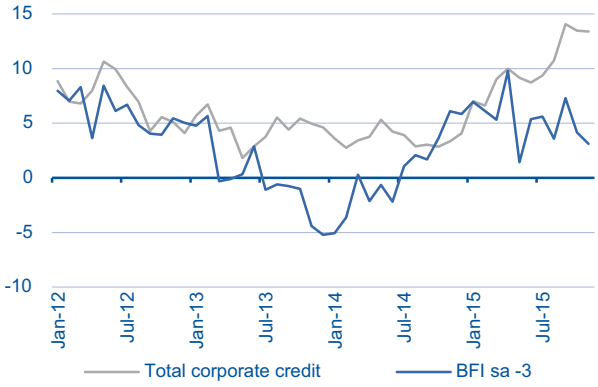
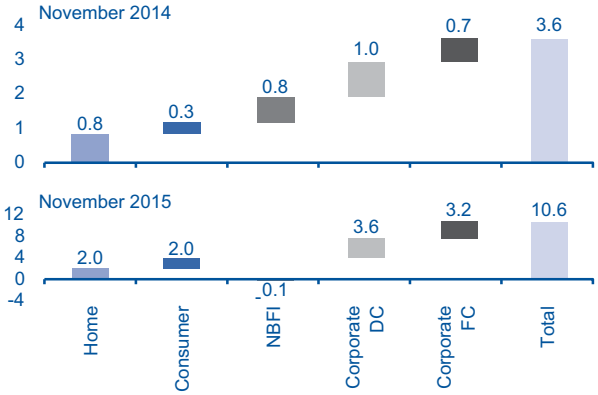


Figure 2.a.9
Contributions to growth of the corporate lending book, pp



Source: BBVA Research with the central bank and INEGI data

The Bank of Mexico data on performing bank credit to corporates by type of currency (Local and Foreign) reveal that an important percentage of this portfolio is foreign currency-denominated (25.1% at November 2015), and that its share has increased in recent months. As explained in more detail in Section 3.b of this edition of the ***Mexico Banking Outlook***, this increase has been the result of increased borrowing in other currencies and, more recently, of the increase in the value of the debt given the exchange-rate depreciation. As shown in Chart 2.a.9, in November 2015 one-third (3.2pp) of the growth in the lending to the non-financial private sector (consumer, housing, corporates and financial intermediaries) was attributable to foreign currency lending to corporates, less than the contribution observed in the same month of 2014 (19% or 0.7pp).

Another way of quantifying the contribution made by the foreign currency portfolio, and in particular the currency depreciation, is to consider how much credit would have growth if the exchange rate had not depreciated. Charts 2.a.10 and 2.a.11 show that since September 2014, if the US dollar had maintained the average of the previous 12 months at that date (around MXN13), the performing credit to corporates would have grown at a real annual average rate of 5.6% between January and November and not 10.1% as it actually grew. As a consequence, in that same period, credit to the private sector would have grown at a real average annual rate of 5.8%, and not 8.0%. In other words, of the growth observed in the corporate loan book and in credit to the private sector during the first 11 months of 2015, 4.5pp and 2.2pp respectively are explained by currency depreciation.

Figure 2.a.10
Lending to corporates and exchange rate
Real annual growth (%) and nominal exchange rate

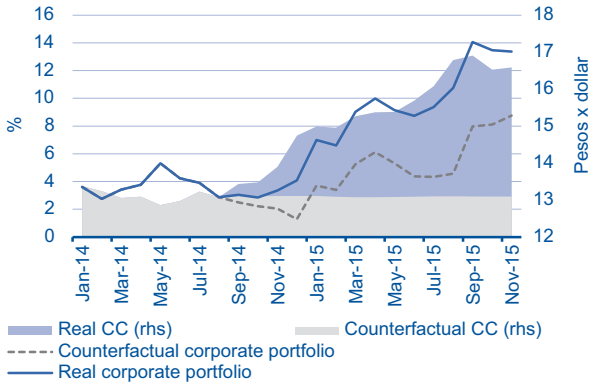
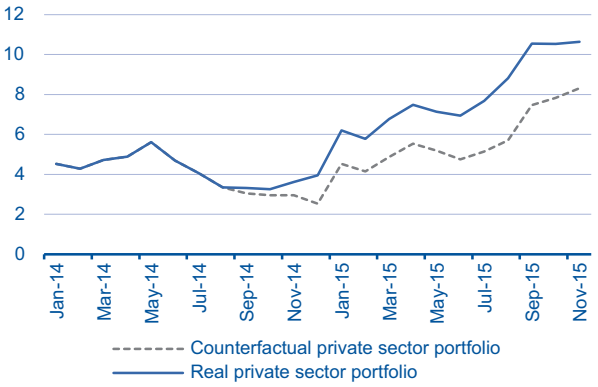


Figure 2.a.11
Credit to the private sector
Real annual growth (%)



Source: BBVA Research with the central bank and INEGI data

Finally, as analysed in Section 3.b of this edition, corporates have recently reduced their foreign currency-denominated borrowing, and appear to be substituting it with local currency financing. This fact could be acting as an additional growth driver to the corporate lending book.

2.a.3. Consumer credit

At end-November 2015, consumer credit registered real annual growth of 7.7%, an improvement on the previous month (6.5%) and more than six times the rate of growth observed in November 2014 (1.2%). This segment has a 25.1% share in the performing credit to the private sector, such that its contribution to the growth of this portfolio was 2.0pp.

In 2015, practically all the components of consumer credit recovered, principally during the second half of the year. This performance was in favourable contrast to the negative trend observed since 2014 (Chart 2.a.12). Credit card finance (CC) (41.2% of consumer credit) was the only less encouraging segment, as it fell in real terms for most of the year. However, the negative bias has gradually diminished, such that in November 2015 it registered real annual growth of 1.0%, the first positive movement since June 2014, when it grew 1.2%. As a result, the CC segment closed the month of November with a positive contribution of 0.4pp to the 7.7% growth of the consumer portfolio.

The segment which has reported the strongest growth is payroll lending (24.4% of the portfolio), which increased at a real annual rate of around 16% in the first half of the year, and from 3Q15 this expansion accelerated to slightly above 18%, which we have not seen since 2012. This meant that this segment continued to be the biggest contributor to the consumer credit portfolio, contributing 4.0pp to the total growth. This was followed by the personal credit segment (20.0% of the portfolio), which continued the deceleration observed in 2014 until the first half of 2015, reaching negative growth of 0.8% and 0.4% in May and June respectively. However, this trend reversed in 2H15, such that in November 2015 the real annual growth reached 12.3%. As a result, personal loans came in second place in terms of growth contribution, making a contribution of 2.3pp. Finally, credit for durable consumer goods also managed to break out of the negative patch observed since 2013, and between January and November 2015 it posted real average growth of 6.1%, its highest since 2006. The performance of this segment reflected the real average growth of 72% in credit for furniture, which represents 0.9% of the performing consumer lending book, and the 2.6% increase in auto credit (9.0% of the consumer credit portfolio).

Figure 2.a.12
Consumer credit - total and by segment
Real annual growth rate, %

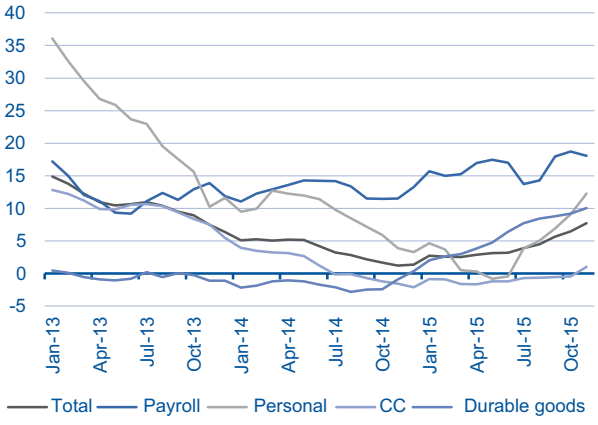
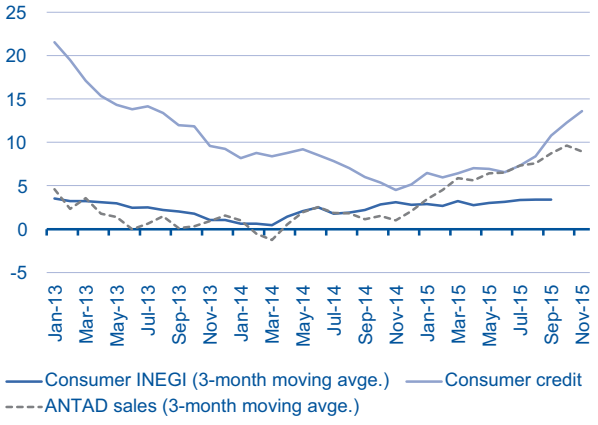


Figure 2.a.13
Consumer credit vs. domestic consumption
Real annual growth rate, %



Source: BBVA Research with the central bank, INEGI and ANTAD data

The performance of consumer credit during 2015 was as a reaction to different factors. The first one is the apparent improvement in domestic demand, as shown by the INEGI consumer indicators and ANTAD's retail sales (Chart 2.a.13). Second, the increase in formal job-creation could be contributing to the fact that more people who previously had no access to bank credit (due to their informal employment condition) can now do so through non-revolving credits, such as payroll loans or credits for the acquisition of durable goods (Chart 2.a.14). An additional factor could be the low inflation environment, which increases household income in real terms and also contributes to the stability of nominal interest rates, which enables them to take larger loans. This explanation appears to be consistent with the evolution of the average size of credit granted for personal and payroll loans. As can be seen in Chart 2.a.15, the average loan granted by the commercial banks during 2014 was in a range between MXN7,000 and MXN9,000, while in 2015 it reached MXN11,000. Meanwhile, in 2014 payroll loans granted were between MXN37,000 and MXN41,000 on average, while in 2015 the figure rose to around MXN50,000.

Figure 2.a.14
Non-revolving consumer credit (real annual growth rate) and total number of workers in the IMSS (rate of growth, %)

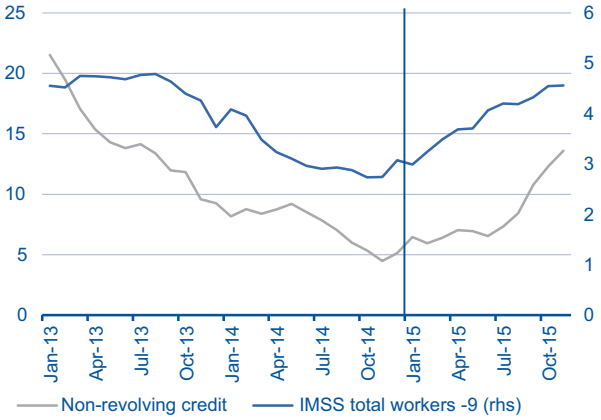
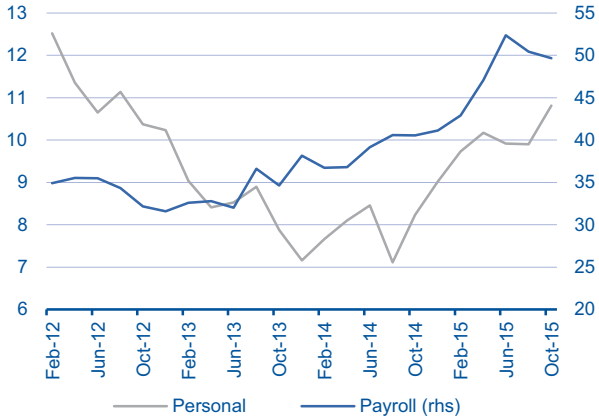


Figure 2.a.15
Average size of payroll and personal loans granted by the commercial banks
MXN '000 at November 2015



Source: BBVA Research with the central bank, INEGI and ANTAD data

In spite of the relative improvement in the principal drivers of demand for consumer credit, in 2015 the performance of CC financing was largely negative, as in November there were only signs of an incipient change of trend. The above could be related to more prudent CC management, or more intensive use of other means of payment such as cash. The more prudent management is reflected in the increase in the percentage of so-called 'full-payers' (customers who pay off the balance on the card in full each month). According to the most recent Report on Basic CC Indicators published by the Bank of Mexico, at June 2015 45.9% of the total number of cards that were up to date with their payments (22.4% of the total) were held by full-payers, a higher percentage than in June 2014, when they represented 43.1% of the total (or 19.7% of the balance). In addition, in the same period the number of differed-payers card customers fell by 3.9%, while their credit balance fell 2.0% in real terms.[1] With regard to the increased use of cash, in its Quarterly Inflation Report for January-March 2015 the Bank of Mexico presented statistical evidence showing that the fiscal measures and regulations related to various payment methods that came into force in January 2014 encouraged individuals to increase their use of cash.[2]

[1] Available at: http://www.banxico.org.mx/sistema-financiero/publicaciones/reporte-de-tasas-de-interes-efectivas-de-tarjetas-/%7B2A3C1939-EBE0-1663-71B4-FBD9AE9EC151%7D.pdf
[2] Available at: http://www.banxico.org.mx/publicaciones-y-discursos/publicaciones/informes-periodicos/trimestral-inflacion/%7B5702711B-997A-2CA5-7042-8B57C41E40B1%7D.pdf

2.a.4. Housing credit

As in the other bank credit segments, the housing segment also registered an important recovery during 2015, particularly during the second half of the year. Between January and November 2015, real average annual growth in housing credit was 8.4%, and in 2H15 alone this growth rose to 10.1%, while to November credit reached a real rate of growth of 10.6% vs. the same month in 2014. These growth rates have not been observed since 2010.

The economic variables more closely related to housing credit include formal and stable employment, as well as consumer expectations of their intention to buy a house. The first is measured by the number of permanent workers registered with the IMSS, while the second is obtained from an index produced by INEGI based on the national consumer confidence survey (ENCO in its Spanish acronym), which asks if any member of the household plans to buy, build or renovate a home in the next two years. This indicator is known as the Housing Confidence Index (ICV in its Spanish acronym), and its close relationship with the performance of mortgage lending is analysed in detail in the July 2015 edition of the ***Mexico Real Estate Outlook***.[3]

The recovery in employment in the second half of 2014 extended into 2015, to the extent that more formal jobs were incorporated into the economy, in line with the formalisation programme implemented by the Federal Government since 2013. Thus, in 1H15 the number of permanent workers in the IMSS rose at an annual average rate of 4.0%, while in 2H15 the increase was a little stronger: 4.3%. Meanwhile, consumer confidence for acquiring a house recovered significantly during 2015, after being stuck in a negative trend since the second half of 2013. As can be seen in Charts 2.a.16 and 2.a.17, the positive performance of housing credit is clearly linked to the improvement observed in the above-mentioned economic indicators.

Figure 2.a.16
Housing credit (real annual growth rate) and number of permanent workers in the IMSS (annual growth), %

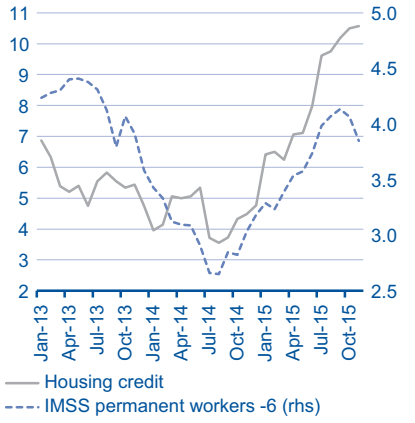


Figure 2.a.17
Housing credit (real annual growth rate) and Housing Confidence Index (annual growth), %

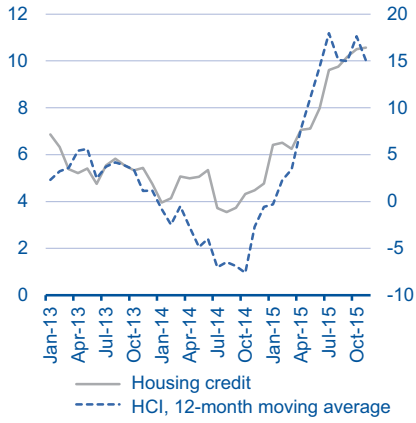
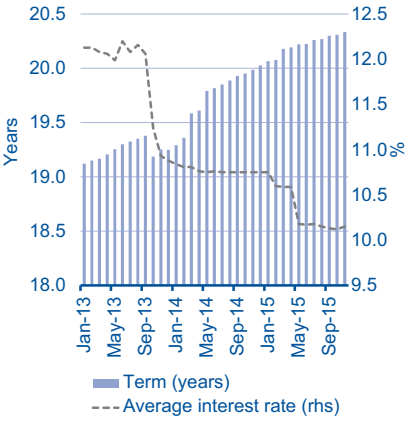


Figure 2.a.18
Interest rate on fixed-rate MXN mortgage loans (%) and loan term (years)



Source: BBVA Research with the central bank, INEGI and CNBV data

[3] Available at: https://www.bbvaresearch.com/en/public-compuesta/mexico-real-estate-outlook-first-half-2015/

On the supply side, the favourable trend in the terms and conditions of the mortgage loans offered by the commercial banks continued during 2015. According to the Bank of Mexico, the average rate of interest on fixed-rate peso-denominated mortgage loans fell by 50bp between 2014 and 2015, from an average level of 10.8% between January and November 2014 to 10.3% in the same period in 2015. Meanwhile, the CNBV data indicate that the average maturity of peso-denominated loans rose from 19.7 to 20.2 years (Chart 2.a.18). Thus the strengthening of formal employment, the improvement in credit conditions and the expectation of interest-rate hikes by the Bank of Mexico were important factors encouraging households to take out a mortgage to buy a home.

2.a.5. Recent evolution of household debt burden

In our tracking of household debt, measured as debt service over consumer credits and mortgage lending over income, we observe that in 2015 this remained at similar levels to 2014.[4]

At end-September 2015, the financial burden of consumer credits stood at 27.1%, i.e. households allocated that percentage of income to paying for credits such as CC, personal and payroll loans (Chart 2.a.19). The majority of that payment (19.3pp of the 27.1% total) was for bank credits, and the remaining 7.8% was allocated to non-banking credit such as department store CCs or auto loans from unregulated multi-purpose financial companies (SOFOMEs, in their Spanish acronym), among others. On average, in the first three quarters of the year the financial burden remained at the same level as during the previous year (27.0%), due to the fact that there was a slight decline (from 19.8% to 19.3%) in bank credits, while non-bank credits increased slightly (from 7.4% to 7.7%).

Figure 2.a.19
Household debt service on consumer credit as % of total wages and public-sector employee remuneration, %

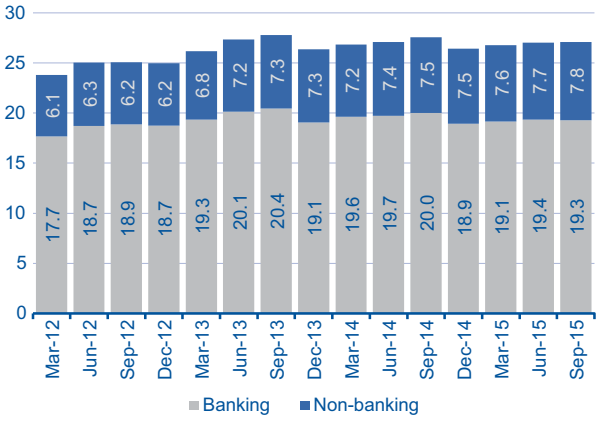
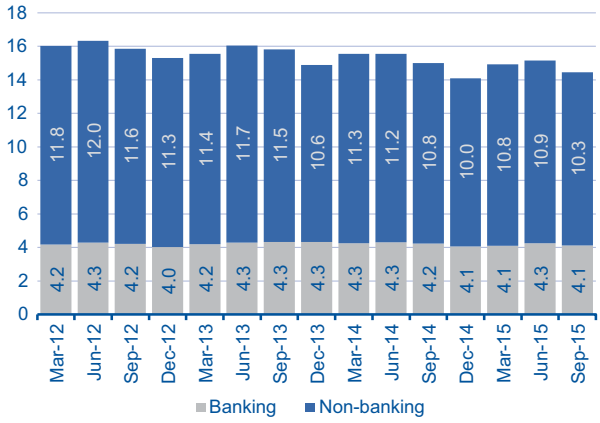


Figure 2.a.20
Household debt service on housing credits as a % of total wages and public-sector employee remuneration, %



Source: BBVA Research with the central bank, CNBV, BMV, INFONAVIT, FOVISSSTE, SHCP and INEGI data

[4] For more detail on the BBVA Research methodology for measuring the household debt burden, please consult the June 2012 and First Half 2014 editions of the ***Mexico Banking Outlook***, available at: https://www.bbvaresearch.com/en/publicaciones/mexico-banking-outlook-june-2012/ and https://www.bbvaresearch.com/en/publicaciones/mexico-banking-outlook-first-half-2014/

With regard to housing credits, the financial burden at 3Q15 represented 14.4% of household income. In this case, the majority of the debt (10.33pp) came from the non-bank sector, and the remaining 4.1% from the banks (Chart 2.a.20). This reflects the substantial involvement of the housing institutions (INFONAVIT and FOVISSSTE) in mortgage financing. Household mortgage expenses fell slightly vs. the previous year, as in the first three quarters of 2015 the average was 14.8%, while in 2014 it was 15.4%. The above was the result of lower interest rates.

2.a.6. Valuation

In the first eleven months of 2015, and in contrast to the previous year, credit to the private sector was characterised by a recovery in its three principal segments. This improvement accelerated in the second half of the year and was linked to the positive trend in the economy, which started to manifest itself during that period.

The progress in formal job-creation, the improved dynamics of domestic demand and the low inflation environment were all factors which contributed to the increase in consumer credit. Although the rate of growth in corporate credit was partly related to some components and sectors of economic activity, its performance was also closely linked to exchange-rate depreciation, given the important share of foreign currency-denominated loans. Finally, housing credit was influenced by both demand and supply factors, including the growth of formal and stable employment, an improvement in individuals' expectations of acquiring a home and credit conditions, which remained favourable.

We expect the positive trend in credit to the private sector to strengthen, provided that the pace of recovery in the principal components of economic activity consolidates. The more robust formal labour conditions and household income will be determining factors in bolstering the expansion of all consumer credit segments and of housing credit, and will help to minimise the risk of any deterioration in those portfolios. The higher foreign currency corporate borrowings could represent a challenge to some companies, particularly if they are to maintain sound fundamentals. It will therefore be important that more investment opportunities arise and that they can be converted into potential revenue flows, such that the companies can access more credit and at the same time meet their financial obligations without any increased difficulties.

Finally, in general terms the recent performance of our financial burden indicator does not indicate, for the moment, signs of over-indebtedness, which is consistent with the evidence presented in Section 3.b of this report. However, as noted elsewhere, it is possible that some lower-income segments of the population are in financial difficulties. This is why we reiterate the importance of the better economic performance expected in 2016 (vs. 2015) having a positive impact on both household and corporate income.

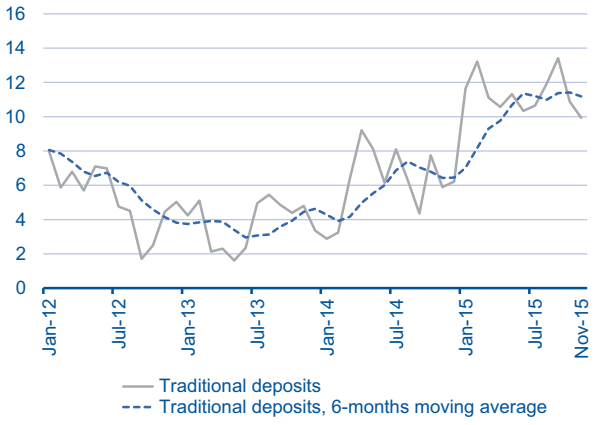
2.b Commercial bank deposits: double-digit growth in 2015

2.b.1 Traditional bank deposits

In the period January-November 2015, the real average annual growth rate of traditional commercial bank deposits (demand and term deposits) reached 11.4%, 5.1pp above that observed in the same period in 2014. With the exception of the month of November, this period was characterised by double-digit growth, with a low of 10.3% in June and a high of 13.4% in September. In November, the real annual variation in traditional banking deposits was 9.9%, 4.0pp above the rate in the same month in the previous year (Chart 2.b.1).

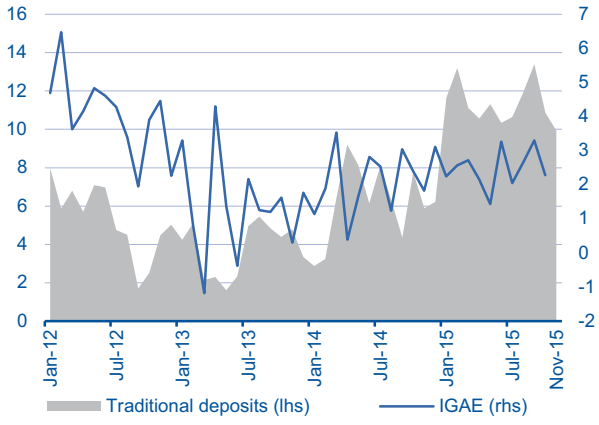
The evolution of traditional bank deposits in the first 11 months of 2015 principally reflected Mexico's economic performance and a combination of other factors, including the electoral process, currency depreciation, the low inflation in the period and the context of uncertainty and volatility in the financial system during those months. As discussed in detail later on in this report, the first of these factors had a positive effect on the growth of traditional deposits from the non-financial public sector in the first quarter of the year, while the next two had a positive impact on traditional deposits from individuals in the second half of the year. Meanwhile, the omnipresent uncertainty in 2015 seems to have had a favourable effect on corporate deposits, as corporates delayed new investment projects and preferred to conserve their resources in more liquid savings instruments such as bank deposits (vs. other less liquid instruments such as fixed-income mutual funds, or FIDs in their Spanish acronym). In addition to the above was the incipient improvement in economic growth observed in the third quarter, as shown in the annual percentage variation of the IGAE[1], which reached 3.3% in September, the high for the period (Chart 2.b.2). From July to September (3Q15), the annual average growth of the IGAE reached 1.7%, 0.4pp more than in the previous quarter or in the same period in 2014.

Figure 2.b.1
Traditional deposits
Real annual growth, %



Source: BBVA Research with the central bank data

Figure 2.b.2
Traditional deposits & IGAE*
Real annual growth, %



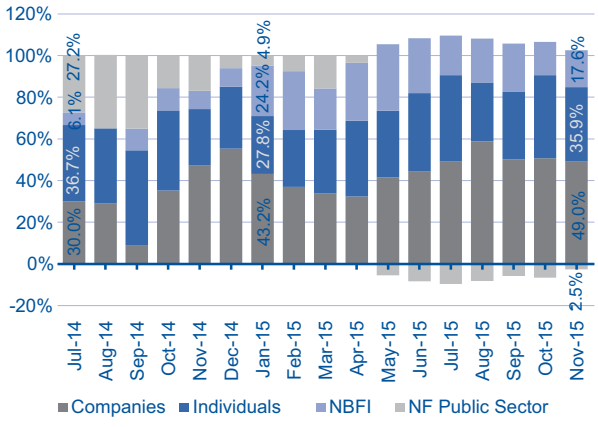
* Original series.
Source: BBVA Research with the central bank and INEGI data

As can be seen in Chart 2.b.3, of all the components of traditional deposits, it was the contribution made by private-sector corporate deposits (38% of traditional deposits in November 2015) which increased the most in the period. In January 2015, corporate deposits represented 43.2% of total growth, with a high of 58.9% in

[1] Original series.

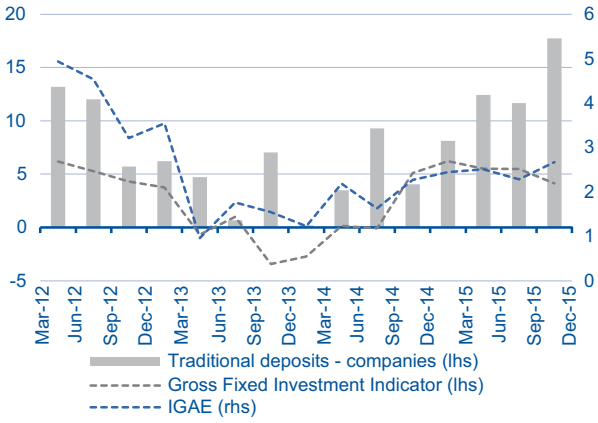
August and 49.0% in November. Chart 2.b.4 illustrates the evolution of the annual percentage variation in the IGAE and the Gross Fixed Investment Indicator, together with the real annual growth in traditional corporate deposits (all variables in quarterly averages). As can be observed, in the second half of the year the momentum of the corporate segment was favourably impacted by their reduced investment, together with the incipient economic recovery from 3Q15. The above suggests that throughout 2015 (and particularly in the second half of the year), companies adopted a cautious approach to executing new investment projects, probably in anticipation of better economic conditions, to the benefit of their balances in traditional deposit instruments. At the same time, the volatility during the period appears to have accentuated the cautious stance adopted by private-sector companies, and encouraged them to maintain their cash in more liquid savings instruments, less exposed to market volatility, such as commercial banking deposits. From January to November 2015, the real average annual growth in corporate deposits amounted to 14.0%, 8.0pp more than in the same period in 2014.

Figure 2.b.3
Traditional deposits.
Contributions by component to total growth, pp



Source: BBVA Research with the central bank data

Figure 2.b.4
Traditional deposits, IGAE & Gross Fixed Investment Indicator*.
Real annual growth, quarterly average, %



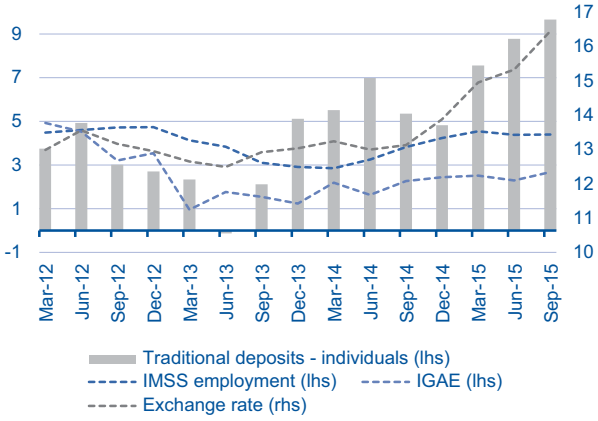
* Original series.
Source: BBVA Research with the central bank and INEGI data

Personal deposits (42.5% of traditional deposits in November 2015) made the second-biggest contribution to traditional deposit growth after private-sector corporates. In our view, there were three factors which contributed to the recovery in deposits from this segment. First, the peso depreciation since 4Q14 increased the purchasing power of remittances in Mexico, which had a positive impact on household income; second, the historically low levels of inflation observed throughout 2015 conserved households' purchasing power, by improving real wages; and third, the number of workers registered in the IMSS increased, which had a favourable impact on household financial income. Chart 2.b.5 shows the real annual growth in personal deposits, together with exchange-rate movements and the number of workers registered with the IMSS. Chart 2.b.6 tracks the real annual percentage variation of personal deposits against inflation. As can be observed, in September 2015 the dollar exchange rate reached a high of MXN16.9,[2] while inflation touched a record low of 2.2% in November that year.[3] Meanwhile, from January to November last year, the annual average increase in the number of IMSS-affiliated workers rose to 4.4%, 0.9pp more than in the same period in 2014. The above partly

[2] Exchange rate for settling foreign currency-denominated obligations (FIX).
[3] Monthly inflation YoY.

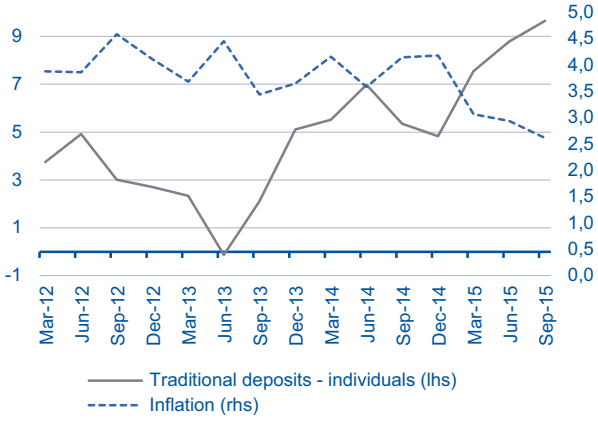
reflects the success of the employment formalisation programme which has been implemented by the federal government since the second half of 2013. In November of 2015, the real annual growth in traditional personal deposits was 8.3%, 1.8pp below the October figure and 4.7pp more than in the same period in 2014. In the first 11 months of the year, the real annual average growth in personal deposits reached 8.8%, 3.0pp more than in the same period in 2014.

Figure 2.b.5
Traditional personal deposits, IMSS-registered employment, IGAE and USD exchange rate. Annual growth rate. Quarterly average, %*



* * IGAE in original series, FIX rate, monthly average.
Source: BBVA Research with the central bank, STPS and INEGI data

Figure 2.b.6
Personal deposits (% real annual var.) & inflation* Quarterly average, %



* Monthly inflation, YoY.
Source: BBVA Research with the central bank and INEGI data

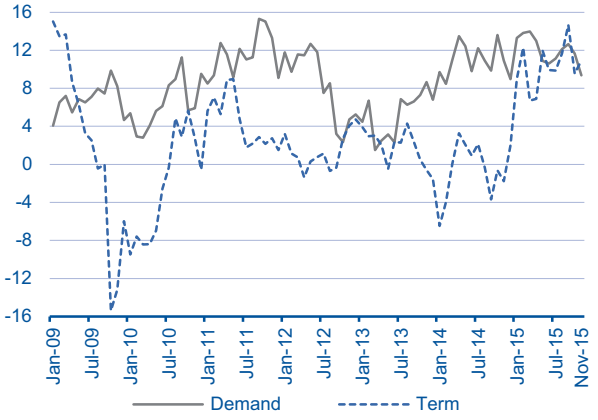
As well as analysing the performance of the deposits made by the agents which contributed the most to the growth in traditional deposits, we have also examined the performance of its components in terms of the time that the financial resources remain in the financial system: demand and term deposits. The following paragraphs detail the growth in these variables in 2015 (January - November), looking at each agent separately (corporates, individuals, non-financial public-sector and non-bank financial intermediaries (IFNB in their Spanish acronym).

2.b.2 Traditional commercial bank deposits: performance by component

The strongest growth in traditional deposits observed from January to November 2015 was due to the acceleration in term deposits, which posted double-digit growth, especially in the second half of the year, reaching a real annual percentage variation of 10.9% in November (Chart 2.b.7). In that month, term deposits represented 4.0pp of the growth in traditional deposits, up from 3.5pp in January, while the contribution of demand deposits to total growth fell from 8.2pp in January to 5.9pp in November (Chart 2.b.8). The real average annual growth in total term deposits in the first 11 months of the year was 10.3%, 11.1pp more than the observed in the same period of the previous year. In November 2015, term deposits represented 37.1% of traditional bank deposits.

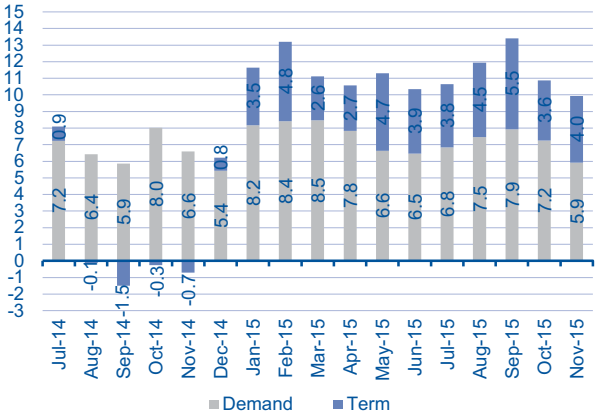
The improvement in the rate of growth of term deposits was in essence a reflection of the increased momentum in corporate deposits. As can be seen in Chart 2.b.9, in November, private-sector companies contributed 48.7% of the total growth in term deposits of 12.6% in January. As noted above in Section 2.b.1, deposits from these agents benefitted from the volatility in the financial markets during the period, which on the one hand made the companies more cautious in terms of carrying out new investment projects (especially after the disappointing 1H15 data for GDP growth) and, on the other hand, increased appetite for more liquid and less volatile savings instruments (vs. other instruments such as fixed-income mutual funds or FIDs). Chart 2.b.10 shows the real annual percentage variation in GDP and Gross Fixed Investment, together with the rate of growth in corporate term deposits. As can be seen, the trend in corporate deposits is linked to slower Gross Fixed Investment, where growth slowed from 6.2% in 4Q14 to a real annual variation of 4.1% in 3Q15.[4] Along with the uncertain global environment, the high prices of imported machinery and equipment as a consequence of currency depreciation could have reinforced the weak momentum in investment observed in the second half of the year, as mentioned in our 3Q15 edition of the ***Mexico Economic Outlook***. In November 2015, private-sector corporate term deposits registered a real annual increase of 18.7%, and represented 31.1% of total term deposits. Note that private-sector term deposits gained ground vs. demand deposits in this segment, and led the strong growth in total corporate deposits observed over the course of 2015.

Figure 2.b.7
Demand & term deposits
Real annual growth, %



Source: BBVA Research with the central bank data

Figure 2.b.8
Traditional deposits. Contribution of sight and term deposits to total deposit growth, pp



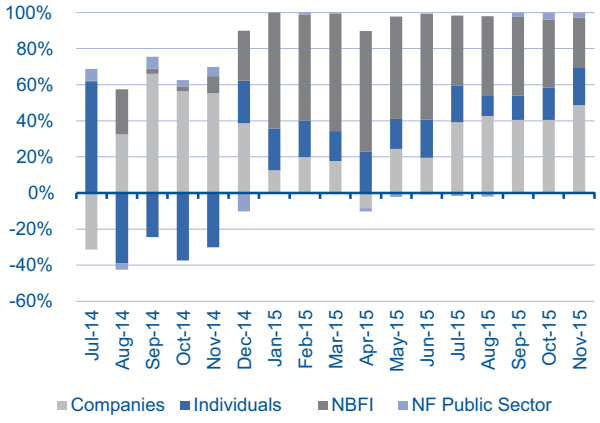
Source: BBVA Research with the central bank data

Although personal deposits were the largest component of term deposits (41.5% in November 2015), there was no sharp increase in their contribution to the real annual growth in total deposits. In November 2015, this segment's contribution to the growth in term deposits was 20.9%, with an average of 19.4% in the first 11 months of the year, 7.8pp below the average in the private-sector corporate segment. Nevertheless, it is worth mentioning that personal term deposits appear to be responding favourably to the positive GDP data in 3Q15, and have been strengthened by the peso depreciation and by employment data, although to a lesser extent than personal demand deposits. As described below, the increase in traditional personal deposits was principally in the form of demand deposits.

[4] Original series.

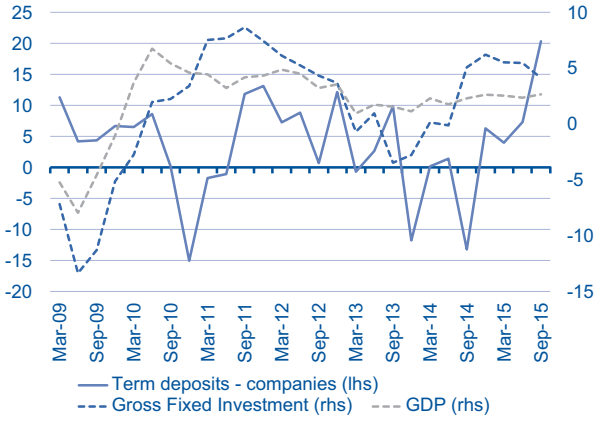
The third component of term deposits were the non-bank financial intermediaries (IFNB), which in November represented 26.3% of the total. In that month, this segment registered real annual growth of 11.7%, vs. 22.2% in January. In November, the growth in IFNB deposits represented 27.3% of the real annual percentage variation in terms deposits, 36.8pp below the level in the first month of the year. On the other hand, non-financial public-sector deposits reported real annual growth of 43.9%. Although growth in this segment was moderate in the early months of the year (probably reflecting the proximity of the elections), it faltered in the second and part of the third quarters, but recovered a considerable amount of the ground lost in the months of September and October. It is possible that this performance to some extent reflected the slowdown in public expenditure in that period. Thus the increase in public expenditure (programmable + non-programmable) observed in November 2015 was reflected in a contraction in the term deposits in that month (Chart 2.b.11).

Figure 2.b.9
Term deposits.
Contribution by component to total growth, %



Source: BBVA Research with the central bank data

Figure 2.b.10
Corporate term deposits, Gross Fixed Investment & GDP. Real annual growth, %

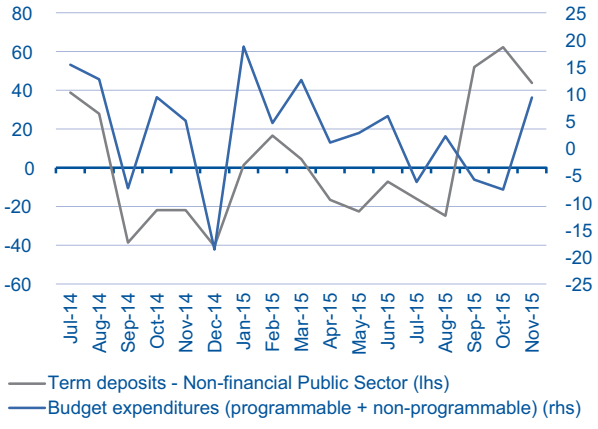


Source: BBVA Research with the central bank and INEGI data

As regards demand deposits, these expanded at an average real annual rate of 12.0% between January and November 2015, 0.9pp more than in the same period in 2014, although in a declining trend, with a slight peak in 3Q15, and the real annual percentage change falling from 13.3% in January to 11.7% in October and 9.4% in November (Chart 2.b.7). This fall was principally driven by the corporate segment (which in November represented 42.2% of the total), and by the non-financial public sector (which represented 11.8% of the total) (Chart 2.b.12). Even though in January the real annual growth of the private-sector corporate segment reached 18.7%, in the following months its growth was around 15.0% and averaged 15.6% over the first 11 months of the year (and 10.8% in November). Meanwhile, non-financial public-sector deposits closed the eleven-month period with an annual variation of -4.5% vs. 7.4% in January. The fall in demand deposits together with the increase in private-sector corporate term deposits could be linked to these agents preferring to hold their cash in accounts which offer fixed returns, given the uncertainty and volatility in 2015 (as we will describe later in this report, the uncertainty also had a negative impact on other savings instruments, such as FIDs). There is also a possibility that corporates used their demand deposits to replace inventory, particularly in the latter months of the year.

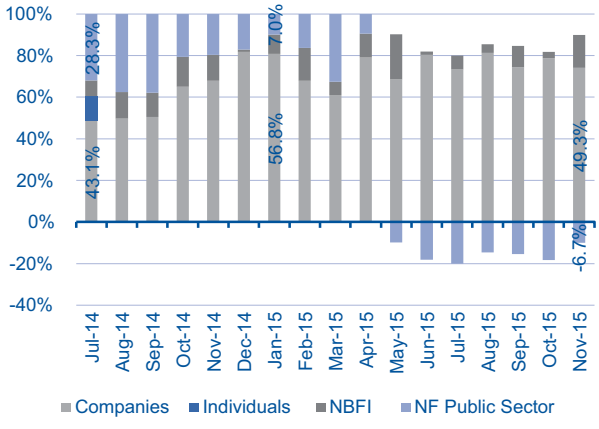
Meanwhile, growth in non-financial public-sector deposits has been in negative territory since May, with a low of -10.9% in July (Chart 2.b.14). Note that demand deposits in this segment represented 95.0% of the total of this segment's holdings of traditional deposits in November. As in the case of the IFNB, the variance in total non-financial public-sector demand deposits was greater than in the other segments.

Figure 2.b.11
Non-financial public-sector term deposits and public expenditure. Real annual growth, %



Source: BBVA Research with the central bank and SHCP data

Figure 2.b.12
Demand deposits.
Contribution to total growth by component, %

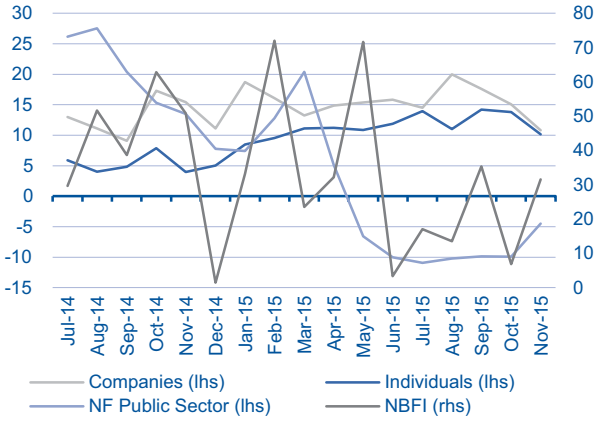


Source: BBVA Research with the central bank data

In terms of personal demand deposits, this segment performed favourably during the period, with the exception of August and November, with double-digit growth since March. In January - November 2015, the real annual growth in this variable averaged 11.5%, 5.3pp more than in the same period in 2014. As noted above in Section 2.b.1, the positive trend in household demand deposits is linked to these agents being able to preserve their purchasing power throughout 2015 as a result of the higher peso value of remittances linked to peso depreciation, historically low inflation and the continuing increase in the number of formal workers. These factors appear to have offset the weak economic momentum in Mexico observed in the first half of the year in particular. At end-November 2015, personal demand deposits represented 62.5% of the traditional deposits of this segment.

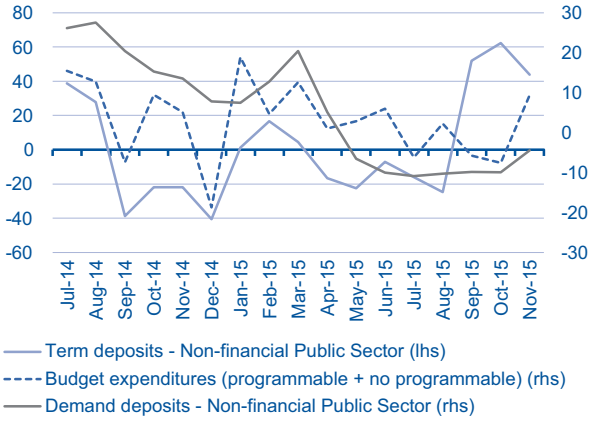
Finally, in the first 11 months of 2015, total IFNB demand deposits expanded at a real average annual rate of 30.9%, 7.9pp more than in the same period in the previous year. As noted above, this segment is one of the ones which saw the most growth in deposits, although this had no significant effect on total demand deposits due to the fact that these types of institutions only represent 3.7% of the total.

Figure 2.b.13
Demand deposits.
Real annual growth by component, %



Source: BBVA Research with the central bank data

Figure 2.b.14
Non-financial public-sector deposits & public expenditure. Real annual growth, %



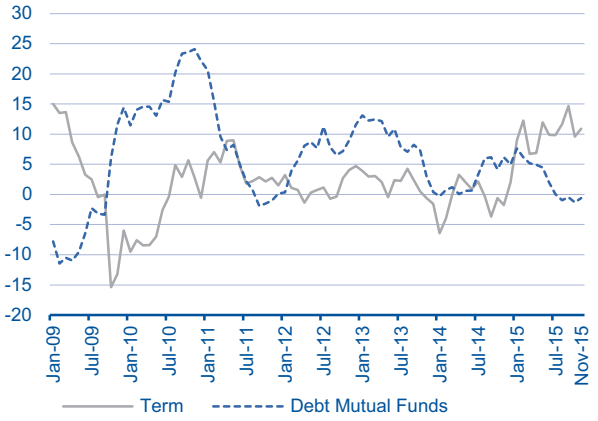
Source: BBVA Research with the central bank and SHCP data

2.b.3 Fixed-income mutual funds and bank term deposits

Since February 2015, total holdings of assets in the hands of the FIDs registered continuous declines in real annual growth rate, from 7.6% in January to -0.6% in November,[5] a fall of 8.3pp over the year as a whole. This contrasts with the recovery in this segment in the second half of 2014. We believe that the volatility in the financial markets during the year (due, inter alia, to the uncertainty over the date of the Fed's increase in reference rates) was the principal factor affecting these institutions' holdings. As already described above, the fall in the real annual growth rate in the FIDs' holdings over the course of 2015 was accompanied by an increase in total term deposits. In previous editions of our Banking Outlook, we have mentioned the existence of a certain degree of substitution between the traditional long-term deposit instruments and those of the FIDs and, as can be seen in Chart 2.b.15, this correlation appears to be more acute in periods of volatility. Although the normalisation of US monetary policy has now started (with an increase in the Fed funds rate and the consequent increase in rates by the Mexican central bank), we cannot rule out further periods of volatility, possibly associated with an environment of low global growth, falling oil prices, the ongoing normalisation of US monetary policy and a more prolonged period of currency depreciation. Thus, to the extent that the agents of the financial system continue to perceive economic perspectives as uncertain, we would expect to observe subsequent falls in total FID balance during the following months.

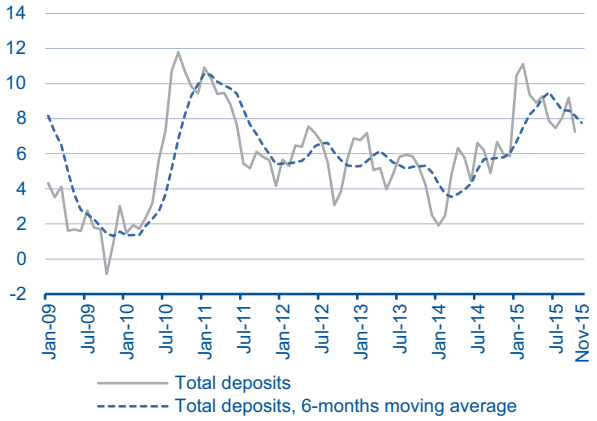
[5] Marginal increases in the real annual rate of growth in this variable were only observed in September and November.

Figure 2.b.15
Term deposits & FIDs, real annual growth, %



Source: BBVA Research with the central bank data

Figure 2.b.16
Total deposits. Real annual growth and 6MMA, %



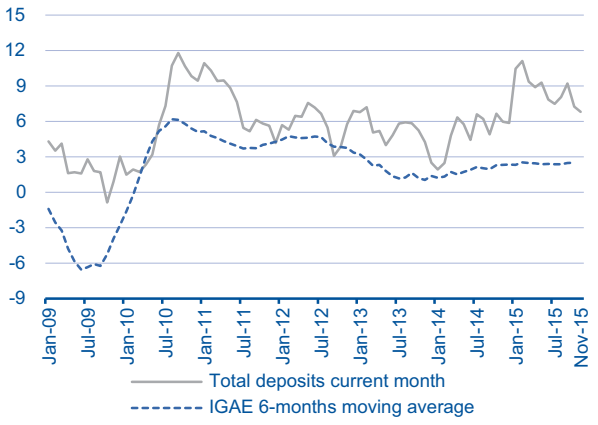
Source: BBVA Research with the central bank data

2.b.4 Total deposits: traditional deposits (demand + term) with FIDs

In this section, we examine the performance of total deposits, demand, term and total holdings of assets in the hands of the FIDs. The analysis of this variable is particularly relevant, as it considers how deposits have evolved, independently of the degree of substitution between its components. We could say that this variable provides information on the total assets that the different agents have channelled into the financial system by means of these three forms of savings.

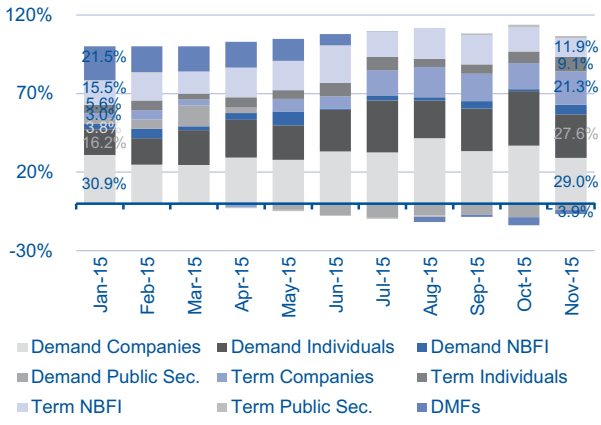
As in the case of traditional deposits, the factors that have an impact on the performance of total deposits include economic activity (Chart 2.b.17), the periods of volatility in the financial system and the variables that affect household purchasing power. Throughout 2015, the real annual growth in total deposits suffered a certain loss of momentum (Chart 2.b.16), principally driven by the declines of funds in the hands of the FIDs and the non-financial public sector. In November 2015, the real annual percentage change in total deposits reached 6.8%, i.e. 3.6pp below the 10.5% registered in January. In that period, the contribution made by the deposits in the hands of the FIDs to total growth decreased from 21.5% in January to -2.6% in November, while the contribution from non-financial public-sector demand deposits fell from 3.8% in January to -3.9% in November (Chart 2.b.18). In November 2015, the balance in the hands of the FIDs represented 26.8% of total deposits.

Figure 2.b.17
Total deposits & IGAE.
Real annual growth, %



Source: BBVA Research with the central bank and INEGI data

Figure 2.b.18
Total deposits.
Contribution to growth by component, %



Source: BBVA Research with the central bank data

The loss of momentum on the part of the FIDs and demand deposits from the non-financial public sector was not offset by the strong growth in corporate term deposits and personal demand deposits during the period. In November 2015, the balance of personal demand deposits represented 27.6% of the growth in total deposits, vs. 16.2% in January. In the same month, the balance of corporate term deposits represented 21.3% of the growth in total deposits, 18.2pp more than in January. In November 2015, personal demand deposits represented 19.2% of total deposits, and corporate term deposits 8.6% at the same date.

2.b.5 Valuation

The first 11 months of 2015 were characterised by an increase in the pace of growth of traditional deposits (demand + term). The double-digit growth in this variable reported throughout most of the year was in contrast to the real annual variation of one digit observed in the same period in 2014. The stronger growth in traditional deposits was principally due to an improvement in corporate (term) and personal (demand) deposits. As well as the incipient recovery that we started to see in the third quarter, we believe that there were other factors that had a positive impact on these variables. First, it is probable that the low economic growth during the first half of the year, together with the instability in the financial system throughout 2015, was reflected in corporates taking a cautious stance and both postpone their investment plans until economic conditions improved, and also to prefer less volatile savings instruments such as commercial bank term deposits (vs. other savings instruments such as those offered by FIDs). Second, the historically low levels of inflation and peso depreciation preserved household purchasing power in 2015, improving real wages and increasing the peso value of remittances, respectively. The latter favoured the balance individuals leaved in commercial bank deposit accounts.

In contrast to traditional deposits, total deposit growth lost momentum as a reflection of a decline in the growth of the FID total. In our view, the volatility and uncertainty in the financial system in 2015 was one of the principal factors that had a negative impact on the growth of balances in the hands of these institutions. The recovery in traditional corporate and personal deposits was not sufficient to offset the decline in FID holdings.

Should the volatility in the financial system continue, we would expect to continue to see companies' investment projects left on hold and further reductions in the growth of FID balances in favour of traditional commercial bank deposits. On the other hand, the preservation of household purchasing power will continue to be affected by inflation and the exchange rate, although its strengthening in the long term will depend on any improvements in economic activity in Mexico. The recovery of economic growth depends on stronger internal demand, greater private investment, more public-sector investment projects, and the acceleration of US growth. As mentioned in the 3Q15 ***Mexico Economic Outlook***, the process of economic growth in Mexico is not immune to risks, the most important of which are falling international oil prices and oil production in Mexico, weaker than expected growth in US manufacturing output and a disorderly correction in the financial markets derived from the normalisation of US monetary policy.

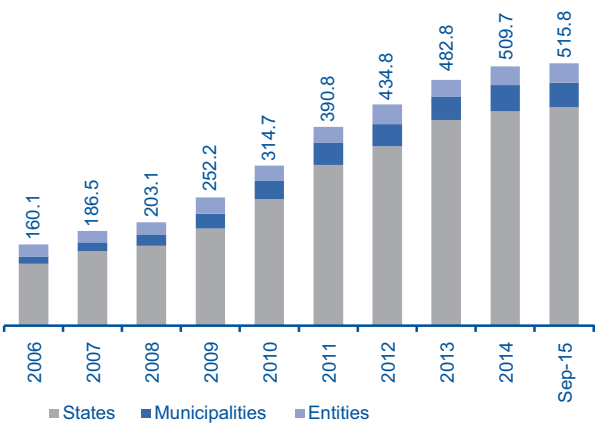
3. Special Topics

3.a. Overview of debt from local governments and entities in Mexico

3.a.1 Introduction

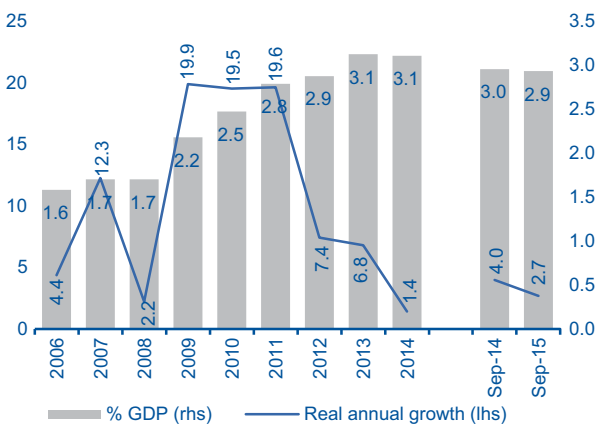
In September 2015, the total debt of federal, municipal and local authorities amounted to MXN515.7bn, equivalent to 2.9% of GDP (Chart 3.a.1). In the past 10 years, the financial obligations of the local governments has increased at a considerable pace: between December 2006 and end-3Q15, total borrowings more than doubled, increasing by 130% in real terms, with the contribution to GDP rising by 1.4pp (Chart 3.a.2).

Figure 3.a.1
Financial obligations of federal entities, municipalities and municipal entities (current MXN bn)



Source: BBVA Research with SHCP data

Figure 3.a.2
Financial obligations of federal entities, municipalities and municipal entities (% of GDP and real growth rate)



Source: BBVA Research with SHCP data

Although the subnational debt has stabilised as a percentage of GDP in the past two years, and the level can still be considered low, the lack of flexibility in local public finances emphasises the importance of tracking the evolution of these obligations. Given the local governments' high dependency on federal transfers[1] and the relationship of the latter with oil revenues, there could be a negative impact on the public finances not only due to the potential future pressure on public finances that servicing these borrowings could entail, but also because in the absence of additional revenue sources, they could Increase the need to take on new financings. Another factor to take into account in the future evolution of local government debt is the forthcoming entry into force of the Financial Discipline for Federal and Municipal Entities Law (LDFEFM in its Spanish acronym), which *inter alia* defines a new legal framework for local public borrowings and the registration of that debt.

[1] According to INEGI data, in the past 10 years federal transfers averaged 82% of federal entities' total revenues and 67% of the total revenues of the municipalities.

The second section of this chapter includes a general review of the structure of subnational debt, identifying the distribution between borrowers and lenders and the principal sources of payment. We then examine the debt and its relationship with the different sources of revenue and, in particular, how the latter are exposed to changes in oil revenues. In the following section, we analyse in detail the distribution of the borrowings between states, municipalities and their entities. Finally, we examine the principal measures in terms of debt considered in the LDFEFM and the possible implication of its approval.

Note that the principal sources of information analysed are the statistics on federal and municipal borrowings published by the Ministry of Finance (the Secretariat of Finance & Public Credit, or SHCP in its Spanish acronym) with information provided by the entities.[2]

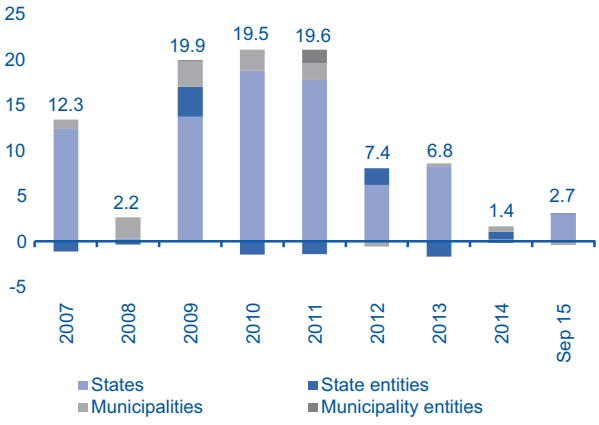
3.a.2. General characteristics of local financial obligations

3.a.2.1. Distribution by type of borrower

In September 2015, the financial obligations of local governments and entities increased at a real annual growth rate of 2.7% (Chart 3.a.3), nearly double that observed at the end of 2014, but well below that registered in the post-crisis period 2009-11 (Chart 3.a.3). Except during 2014, the state governments have been driving the expansion in these local borrowings.

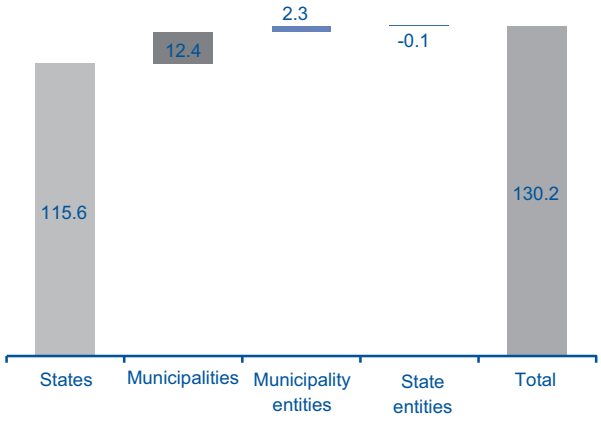
In an analysis of the growth by type of borrower in the period December 2006 to September 2015, it can be seen that the borrowings of the estates contributed 115.6pp of the 130.2pp of real growth registered during the period (nearly 89% of the total, followed by municipal debt, which contributed 12.4pp), while local entities (state and municipal) together contributed only 2.2pp to the real aggregate growth rate (Chart 3.a.4).

Figure 3.a.3
Real annual rate of growth (%)



Source: BBVA Research with SHCP data

Figure 3.a.4
Contribution to real accumulated growth (Dec-06 to Sep-15, %)

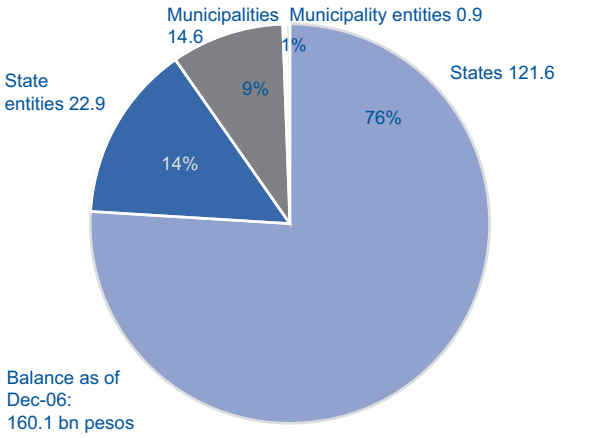


Source: BBVA Research with SHCP data

As a result of this momentum, in September 2015 the share of states' debt in the total increased from 76% to 83% compared with the end of 2006. Meanwhile, municipal debt was equivalent to 10% of the total in September 2015, slightly higher than the 9% observed in December 2006. (Chart 3.a.5 & Chart 3.a.6).

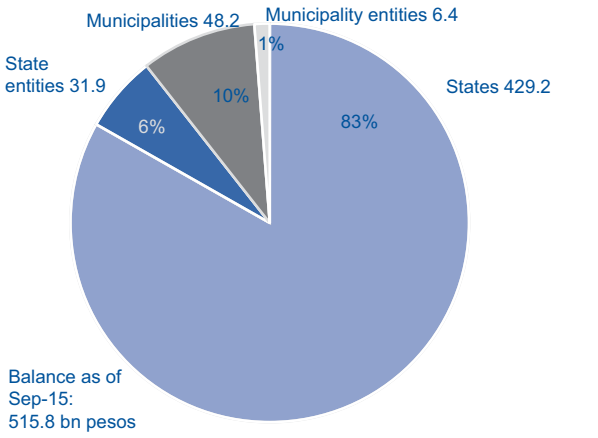
[2] The entities only have to register the obligations which affect their shares of federal revenues in the official debt register (Registro de Obligaciones y Empréstitos de las Entidades Federativas y Municipios). However, the statistics include other obligations but not necessarily all the entities' debt, such that the figures could underestimate total sub-national debt.

Figure 3.a.5
Distribution of local debt by type of borrower (MXN bn & % of total)



Source: BBVA Research with SHCP data

Figure 3.a.6
Distribution of local debt by type of borrower to Sep15 (MXN bn & % of total)

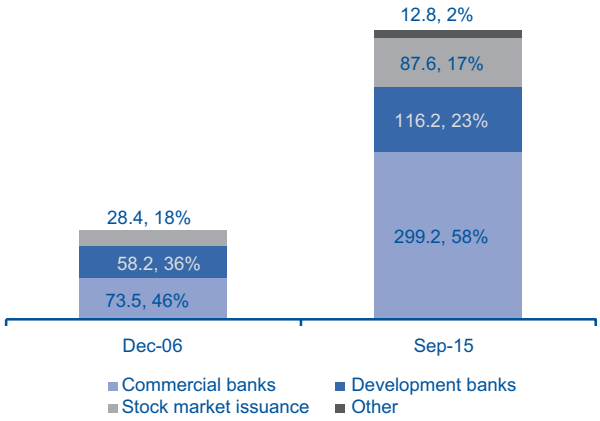


Source: BBVA Research with SHCP data

3.a.2.2. Distribution by type of lender

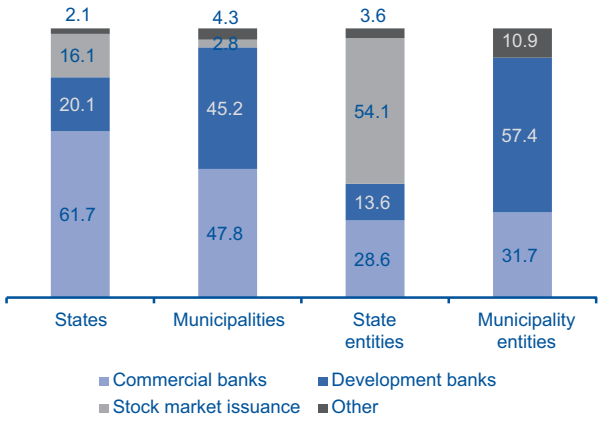
The principal providers of financing for the local governments and entities are commercial banks, with a total outstanding of MXN299.2bn in September 2015. Their share of the total has increased, from 46% in December 2006 to 58% in 2015. They are followed by development banks, with MXN116.2bn (23%), less than half the amount placed by commercial banks, and bond issuances, the last contributed with MXN87.6bn to local financing (17%). Compared with December 2006, there are other new lenders which the Ministry of Finance statistics classify as "other" and include funds and development trusts and Sofomes (Sociedades Financieras de Objeto Múltiple or multi-purpose finance companies), these providers represented 2% of subnational debt in September 2015. (Chart 3.a.7).

Figure 3.a.7
Distribution of local debt by type of lender (MXN bn & % of total)



Source: BBVA Research with SHCP data

Figure 3.a.8
Distribution of local debt by type of borrower and lender to Sep-15 (%)



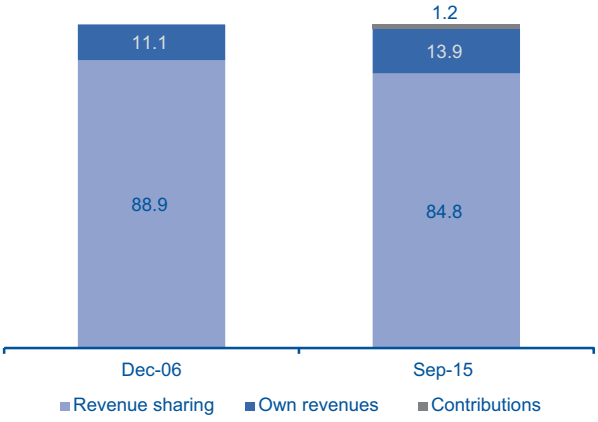
Source: BBVA Research with SHCP data

By type of borrower, at end-3Q15 states received 61.7% of their financing from the commercial banks. The municipalities' sources were more diversified, with similar proportions from commercial banks and development banks (47.8% and 45.2% respectively), while state entities largely relied on bond issuances (54.1% of their total borrowings) and most of the debt of the municipal entities was from the development banks, which financed 57.4% of their outstandings (Chart 3.a.8).

3.a.2.3. Guarantee and source of payment

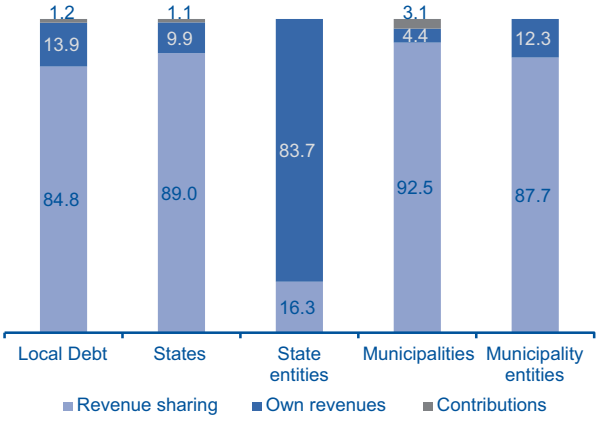
The principal source of payment for the local financial obligations is federal revenue sharing[3]. In the last 10 years, its importance as a source of payment or guarantee for local debt has fallen slightly, from 88.9% of the total in December 2006 to 84.8% in September 2015, while the contribution from local own revenues has increased from 11.1% to 13.5% in the same period. Also, federal transfers were included as a source of payment,[4] and they support 1.2% of local debt (Chart 3.a.9).

Figure 3.a.9
Payment sources for local debt (% of total)



Source: BBVA Research with SHCP data

Figure 3.a.10
Payment sources by type of borrower (%)



Source: BBVA Research with SHCP data

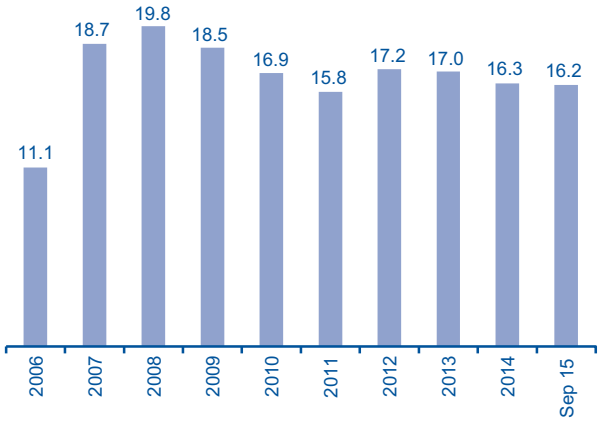
In a comparison by type of borrower, note that, due to the nature of the services that they provide, the state and municipal entities are the ones that can use their own revenues as a source of payment or guarantee more frequently. Meanwhile, the municipalities are the ones that depend the most on federal resources (revenue sharing and transfers) to service their debt (Chart 3.a.10).

[3] Revenue-sharing transfers (Branch 28) are the resources allocated to the states and municipalities under the terms of the Fiscal Coordination Law (LCF in its Spanish acronym) and the adhesion agreements to the Fiscal Coordination and Administrative Collaboration on Federal Fiscal Matters. These are resources that the local authorities can allocate freely (i.e. they are not designated to or conditional on anything specific).
[4] The federal contributions to federative and municipal entities (Branch 33) are the mechanism by which resources are transferred to the local governments to pay particular expenses. As such, some of the funds may be used to pay the local governments' financial obligations.

3.a.2.4. Maturities and rates of interest

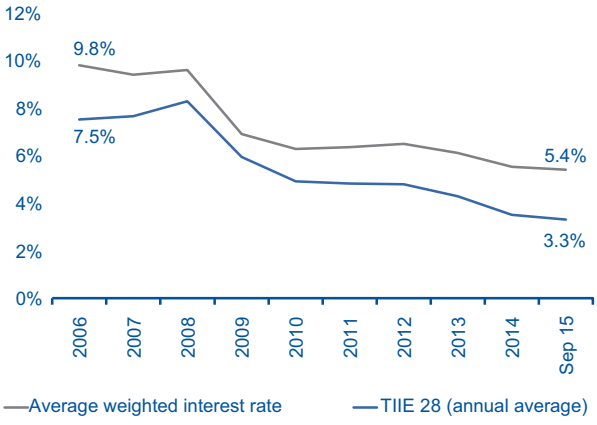
At end-3Q15, the average weighted maturity of the local debt was 16.2 years, 5.1 years longer than at the end of 2006. Note that in the period when total debt increased the most (2009-11), the average term shortened, indicating that the financing taken on in that period was, on average, shorter-term (Chart 3.a.11). Meanwhile, the average weighted rate of interest has fallen considerably in the last ten years, from 9.8% at end-2006 to 5.4% in September 2015. The spread with reference rates such as the TIIE28 has also narrowed (Chart 3.a.12).

Figure 3.a.11
Average weighted maturity (years)



Source: BBVA Research with SHCP data

Figure 3.a.12
Average weighted interest rate (%)

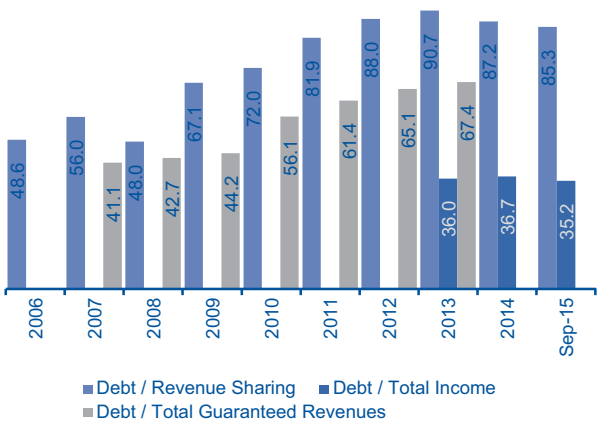


Source: BBVA Research with SHCP data

3.a.3. Local debt and some revenue sources

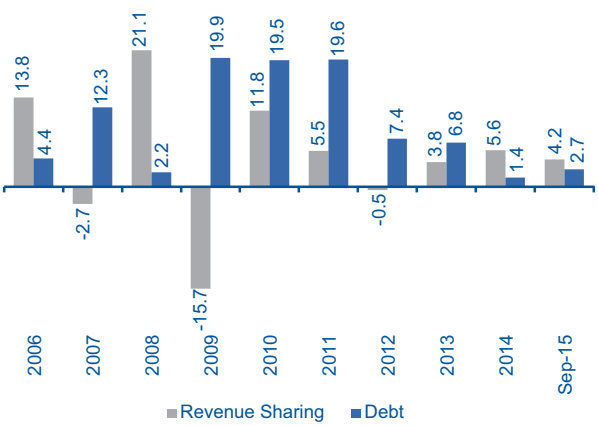
Subnational debt as a proportion of federal revenue sharing has increased over the past 10 years, rising from 48.6% in December 2006 to 85.3% in September 2015 (Chart 3.a.13). This reflects the uneven momentum of local borrowing vs. this source of revenues: the growth in debt outstanding exceeded the growth in the income received from revenue sharing between 2009 and 2013 (Chart 3.a.14). Thus the accelerated expansion in debt growth was a mechanism to make up for local revenues due to the decline in federal revenue-sharing transfers during those years.

Figure 3.a.13
Total local borrowings vs. different revenue sources (%)



Source: BBVA Research with SHCP data

Figure 3.a.14
Real growth in local debt and revenue sharing (%)



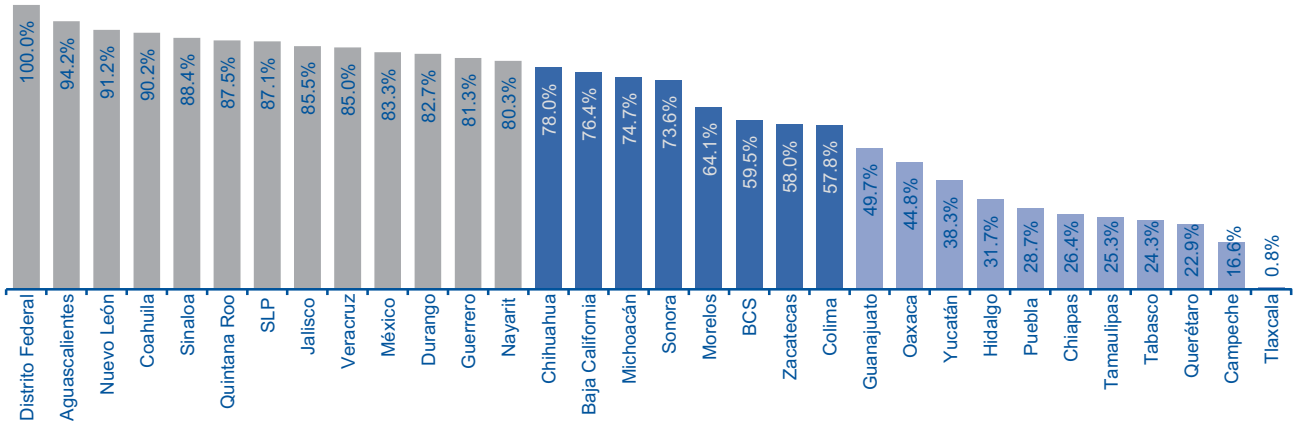
Source: BBVA Research with SHCP data

In addition to the revenue sharing, the SHCP has published debt indicators regarding other sources of revenues, although with different periodicity. For the 2007-13 period, total debt was measured against total revenues that can be used as a guarantee.[5] This ratio also increased significantly during the period when the calculation was available: sub-national debt rose from 41.1% of total guaranteed revenues in 2007 to 67.4% in 2013. From 2013, the SHCP statistics reported total debt in relation to total revenues, a broader measure than revenues that can be used as guarantee,[6] and as a result, the percentage fell to only 35.2% at end-3Q15 (Chart 3.a.13).

As analysed in Section 3.a.2.3, the principal guarantee and source of payment for subnational debt was federal revenue sharing. Another way of evaluating the debt burden of the local entities is the proportion of revenue sharing "affected" by these obligations. In this case, according to the SHCP, the indicator "corresponds to the resources deposited by the treasury of the federation or the state treasuries, on the instructions of the states or municipalities to a payment vehicle (trust); in the same way as the revenues, which are deposited to pay an obligation in accordance with a mandate or instruction given by those entities". Even though the percentage of revenue-sharing transfers concerned does not necessarily correspond to the amount used to pay the debt service, this measurement is important because, given the limited local tax collection, committing a high percentage of the revenue sharing income could reduce the flexibility of local finances.

On reviewing this indicator, we find that at September 2015 more than 80% of the revenue sharing of 13 states (including the Federal District) is affected, more than 50% but less than 80% at eight states, and less than 50% at 11 states (Chart 3.a.15).

Figure 3.a.15
Percentage of revenue-sharing transfers affected to debt payment (%)



Source: BBVA Research with SHCP data

The available indicators show that there is still a need for appropriate and homogenous revenue measurement to evaluate the level of borrowing by local governments and entities. Although the most commonly used measurement relates to federal revenue sharing, the results are based on the total amount of revenue-sharing transfers, when only part of these revenues can be devoted to debt service.[7] On the other hand, the most

[5] Includes the revenue-sharing transfers (Branch 28), 25% of the Social Infrastructure Contribution Fund (FAIS in its Spanish acronym), 25% of the Federative Entity Reinforcement Fund (FAFEF in its Spanish acronym) and the federative entities' own revenues. Does not include the municipalities' own revenues.
[6] The total revenues include federal revenue-sharing transfers, taxes, rights, products, utilisations, federal transfers but exclude extraordinary revenues and interest income. The total also includes revenues collected at a municipal level through property taxes and water rights.
[7] Article 9 of the LCF specifies that only the General Revenue Sharing Fund, the Municipal Development Fund and a share of the special tax on production and services associated with fuel consumption can be used for the payment of the federative and municipal entities' obligations. These resources represent approximately 87% of total revenue-sharing transfers.

recent indicator incorporated into the Ministry of Finance reports, which relates total debt to total revenues, could underestimate the degree of leverage, as by including 'federal transfers" these can be considered as earmarked revenues which cannot be used to pay or guarantee debt. In addition, there is still no public or homogenous indicator that measures debt service (interest, capital repayment, commissions and other associated costs) as a percentage of any form of revenue, which would be useful for identifying the pressures on the flow of revenues and expenses at the sub-national entities.

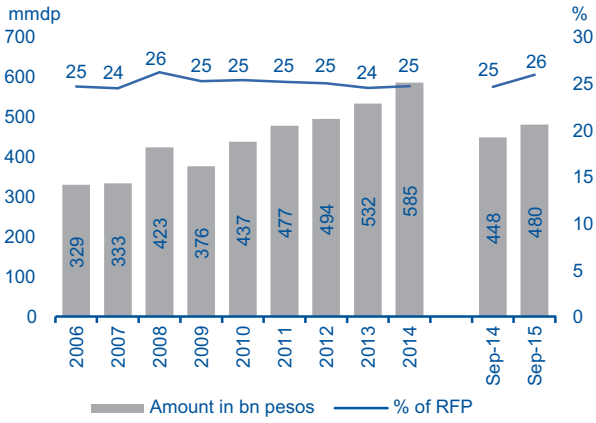
Due to the importance of revenue-sharing transfers as a means of gearing, and given that they are the principal source of payment and guarantee for local government borrowings, the following section includes a brief review of their evolution and the possible impact of oil revenues on the flow of these resources.

3.a.3.1. Evolution of federal revenue sharing

Shared federal receipts (RFP in their Spanish acronym) are the basis on which the majority of transfers received by the state and municipal governments are distributed. They are determined by the taxes collected by the Federation, mining rights (not including repayments of these contributions) and also incorporate a fraction of the federal government's oil revenues and of its revenue surplus.[8] Various of the funds that comprise Branch 28 (revenue sharing) are calculated as a percentage of the RFP, explaining the importance of the latter in understanding their evolution.

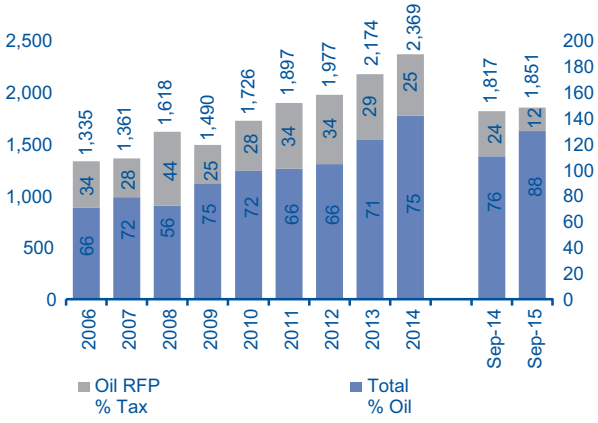
In September 2015, the revenue sharing for states amounted MXN480bn, and represented 26% of RFP, a similar percentage to the average observed in the 2006-14 period (25%) (Chart 3.a.16). Meanwhile, at the close of 3Q15, the RFP amounted to MXN1,851bn. Due to various factors that impact the determination of the RFP, such as economic performance (which affects the performance of the tax element through income tax, value-added tax or excise tax (ISR, IVA and IEPS in their Spanish acronyms), developments in the oil market (which affects the tax collection from the various oil extraction rights) and different fiscal policy measures, the composition of the tax and oil components of the RFP vary significantly over time. Thus, in September 2015, the oil RFP only represented 12% of the total, its lowest level since 2006 (Chart 3.a.17).

Figure 3.a.16
Revenue sharing: total in current MXN bn and % of RFP



Source: BBVA Research with SHCP data

Figure 3.a.17
RFP (total in current MXN bn and distribution by source of funds) (%)



Source: BBVA Research with SHCP data

[8] This basis of distribution excludes the revenues detailed in Article 2 of the LCF.

The rate of growth of the revenue-sharing transfers was closely related to the developments in the RFP. In 2006-14, the correlation coefficient between the real rates of growth of the two variables was 0.97 (Chart 3.a.18). As regards the RFP dynamics, this was revealed to be dominated by the oil component during the 2006-11 period, after which the growth in the tax component successfully offset the decline in the oil component. Meanwhile, the oil component closely followed the movements in the price of Mexican Export Blend (PMME in its Spanish acronym): the correlation coefficient between the real growth in the oil RFP and the variation in the PMME was 0.84 in the period 2006-14 (Chart 3.a.19). Thus a close relationship can also be observed between the changes in the revenue sharing and the PMME: the correlation coefficient between the rates of growth of these two variables was 0.76 between 2006 and 2014 (Chart 3.a.20).

Figure 3.a.18
Real rate of growth in revenue sharing and the RFP (%)

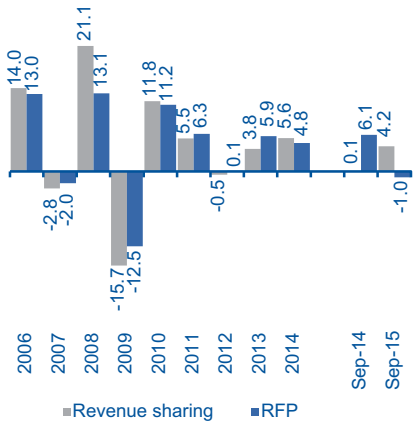


Figure 3.a.19
Real rate of growth of the RFP and variation in the PMME (%)

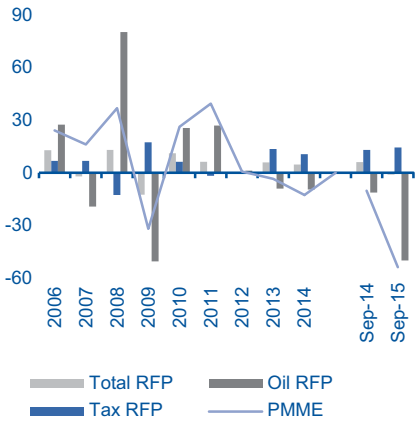
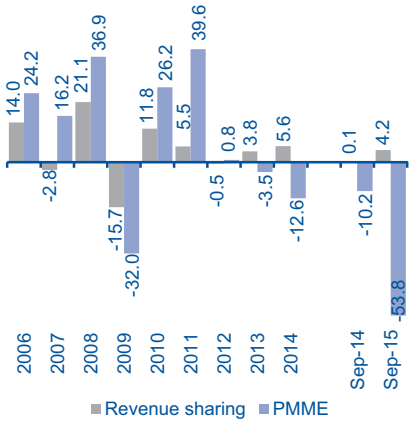


Figure 3.a.20
Real rate of growth in revenue sharing and variation in the PMME (%)



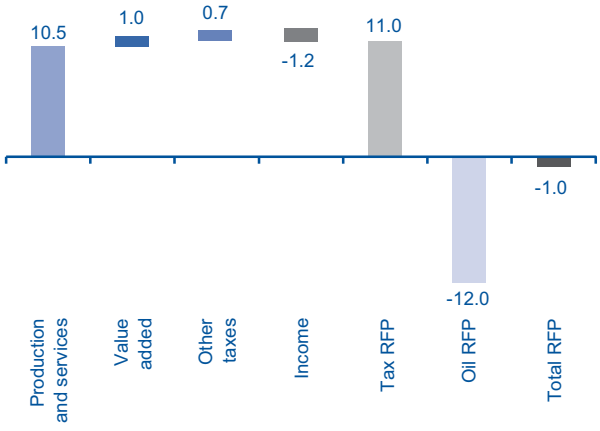
Source: BBVA Research with SHCP data

In spite of the relationship observed between revenue-sharing transfers, the RFP and the PMME in recent years, note that during 2015 this appears to have decoupled: even with the 53.8% drop in the PMME in September 2015 (vs. September 2014), the RFP only fell 1% in real terms (in the same period), while revenue sharing registered real growth of 4.2% vs. September 2014.

The changes in the composition of the growth in the RFP and revenue sharing, derived from the various tax reforms implemented during 2014, could explain this performance. In September 2015, the tax component of the RFP contributed 11pp to the real rate of growth of the RFP, which were partially offset by the 12pp drop in the oil component. In the tax component, revenues associated with the special tax on production and services (the excise tax, or IEPS) were the main drivers, contributing 10.5pp to the growth in this component (Chart 3.a.21). The excise tax driver which forms part of the RFP is principally explained by gasoline taxes. According to Ministry of Finance data, from 2015 and based on the modifications to Pemex's tax regime, the excise taxes on gasoline[9] are included under the heading of RFP tax revenues as federal and state gasoline[10] (Chart 3.a.22).

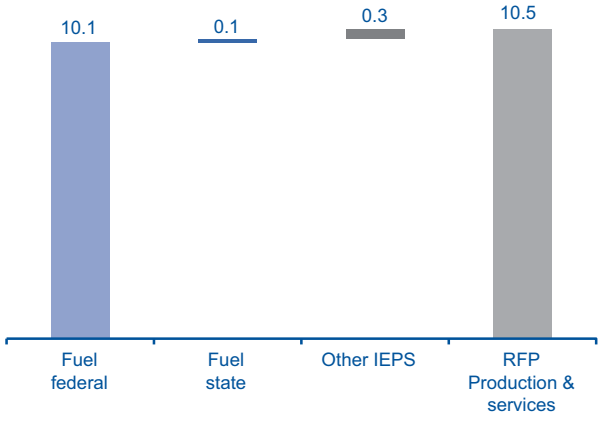
[9] Article 2-A Sections I and II of the IEPS Law.
[10] For comparative purposes, the historical reference information, which up to 2014 was included under the heading of oil revenues, are considered as tax revenues.

Figure 3.a.21
Contribution to the real rate of growth in the RFP (pp, Sep-15)



Source: BBVA Research with SHCP data

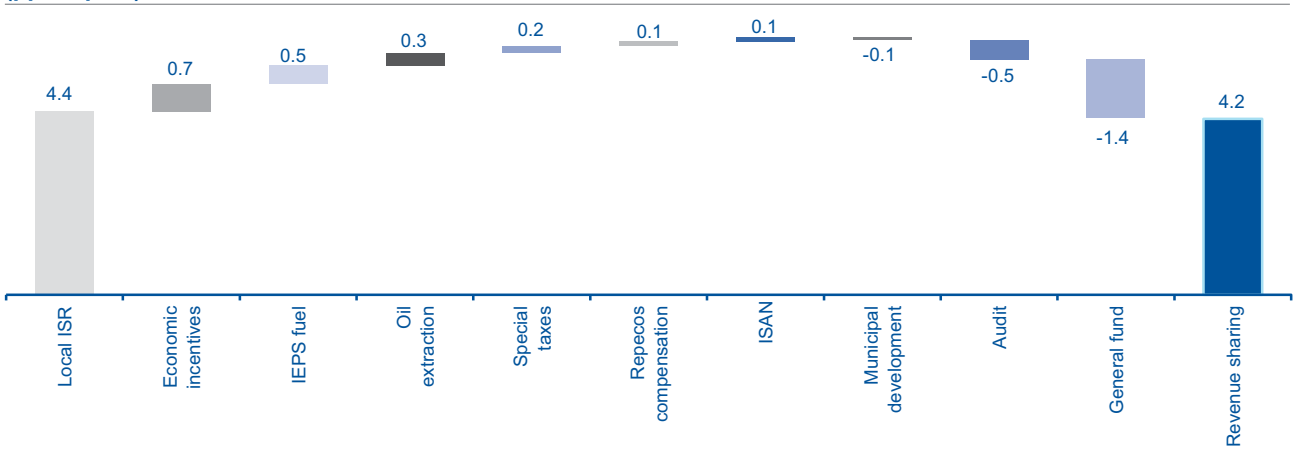
Figure 3.a.22
Contribution to the real rate of growth of the IEPS in the RFP (pp, Sep-15)



Source: BBVA Research with SHCP data

Meanwhile, the 2014 reforms to the Fiscal Coordination Law included the incorporation of a new element into the calculation of revenue sharing: 100% of the income tax (ISR) corresponding to the wages of personnel who provide or carry out a subordinated personal service in the offices of states, municipalities and the Federal District, as well as their respective autonomous entities, parastatal and paramunicipal entities. Thus, when analysing the composition of the real rate of growth in revenue sharing at 3Q15, we observe that the contribution from the local bureaucracy income tax was 4.4pp, and was the main factor helping to offset the fall in other funds that are included in the revenue sharing calculations (Chart 3.a.23)

Figure 3.a.23
Contribution to the real rate of growth in revenue sharing (pp, Sep-15)



Source: BBVA Research with SHCP data

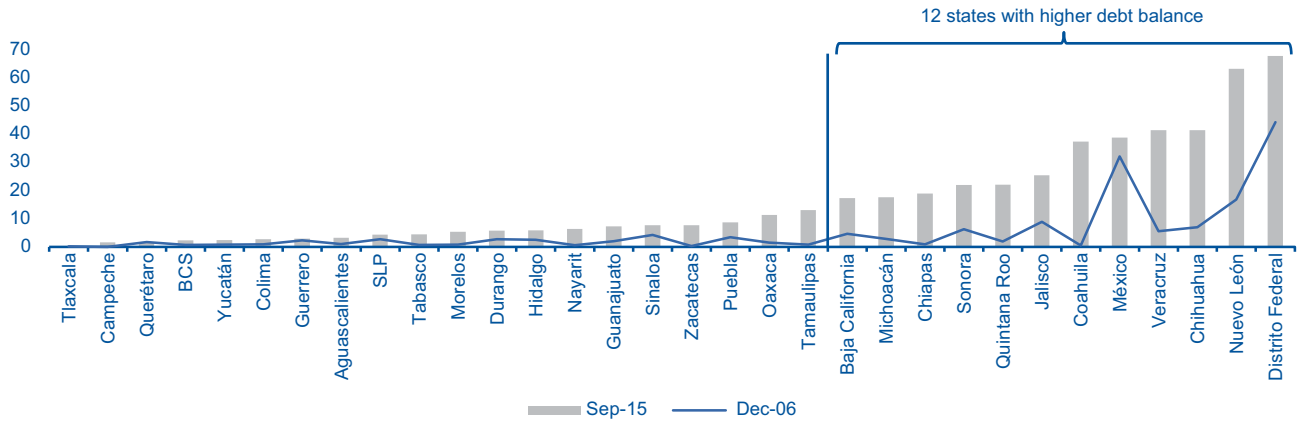
In summary, to date the flow of revenue-sharing transfers to the federative entities and municipalities has not been affected by the fall in oil revenues due to two factors: first, the momentum in the tax element of the RFP thanks to excise taxes associated with gasoline, and second the revenues included in the revenue sharing associated with income tax on the wages of local government employees.

3.a.4. Debt by federal entity

This section analyses the balances of the financial obligations by state. For the sake of brevity, when reference is made to a federal entity, the state's own obligations, those of its boroughs and local bodies are considered (state and municipal).

In September 2015, twelve federal entities accounted for 80% of the balance of obligations: Baja California, Michoacán, Chiapas, Sonora, Quintana Roo, Jalisco, Coahuila, State of México, Veracruz, Chihuahua, Nuevo León and the Federal District (FD). There is less concentration compared with the distribution at year-end 2006, because in that year nine states accounted for 81% of the total debt (Sinaloa, Baja California, Veracruz, Sonora, Chihuahua, Jalisco, Nuevo León, State of México and the Federal District). Between December 2006 and September 2015, only Sinaloa dropped out of the group of states with the highest levels of borrowing, while Coahuila, Quintana Roo, Chiapas and Michoacán joined the list (Chart 3.a.24).

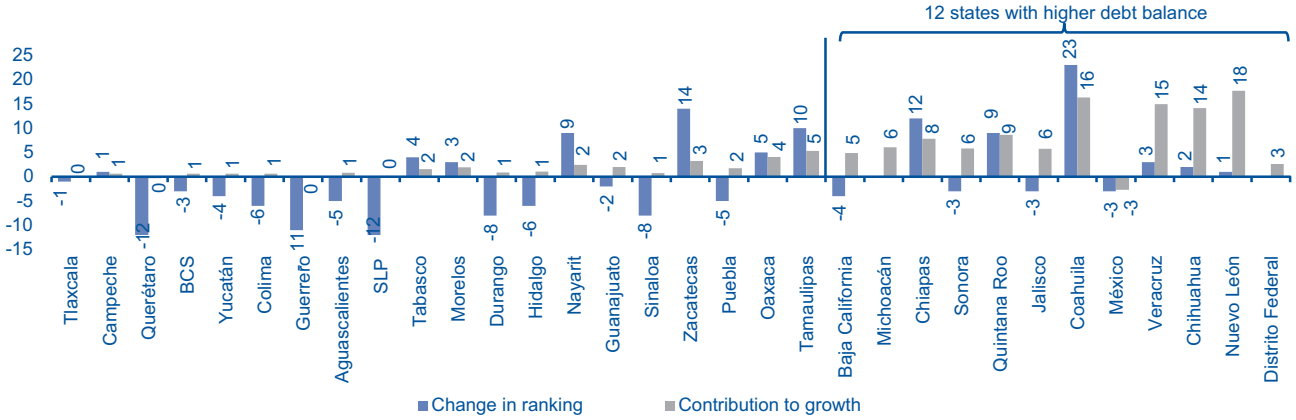
Figure 3.a.24
Balance of financial obligations by federal entity (MXN bn, Sept-15)



Source: BBVA Research with SHCP data

If we look at the ranking of the states, with 1 being the state with the highest debt and 32 that with the lowest, the relative movement of some states between year-end 2006 and 3Q15 is striking. The states that increased their debt the most in relative terms include Coahuila (which jumped from number 29 to number 6, a rise of 23 places), Zacatecas (from number 30 to 16, up 14 places), Chiapas (from 22 to 10, moving up 12 places in the ranking) and Tamaulipas (up 10 places from 23 to 13). The states that recorded an improvement in their relative positions include: Querétaro and San Luis Potosí, which fell 12 places (from 18 to 30 and from 12 to 24 respectively), while Guerrero fell 11 places from 15 to 26 (Chart 3.a.25).

Figure 3.a.25
Movement in the ranking of borrowing and contribution to accumulated growth (Number of places, %, Dec-06 - Sept-15)

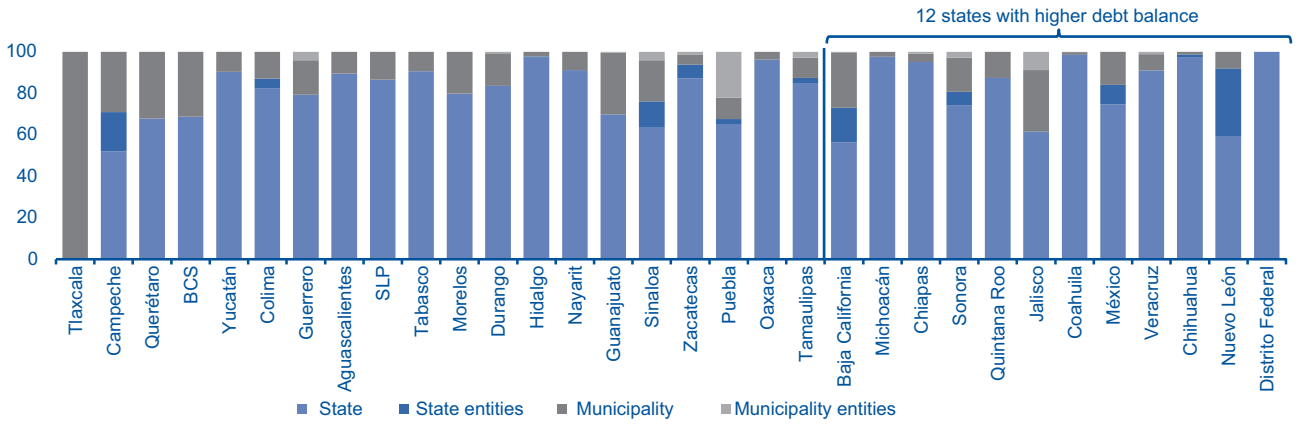


Source: BBVA Research with SHCP data

The twelve entities with the largest debt contributed 102pp to the 130% real accumulated growth between December 2006 and September 2015 (although not all of them showed any significant movement in their relative positions). Hence, the states the made the largest contribution to the growth in debt observed during the reference period were Nuevo León (18pp), Coahuila (16pp), Veracruz (15pp) and Chihuahua (14pp) (Chart 3.a.25).

Analysing the share of the different public bodies in the debt of each state, you can see that in September 2015 there are entities in which the obligations of the entity's own government represent over 97% of the total, such as Coahuila, Chihuahua, Michoacán and Hidalgo (the latter is not among the top 12 entities with the highest debts). The state bodies with the highest share in the state total are to be found in Nuevo León (32.9%), Campeche (19.0%) and Baja California (16.6%). The states with the highest percentage of municipal debt, in turn, were: Tlaxcala, Querétaro, Baja California Sur, Jalisco and Guanajuato. Finally, only Puebla has a significant amount of municipal entity debt as a proportion of the state total (22.1%) (Chart 3.a.26).

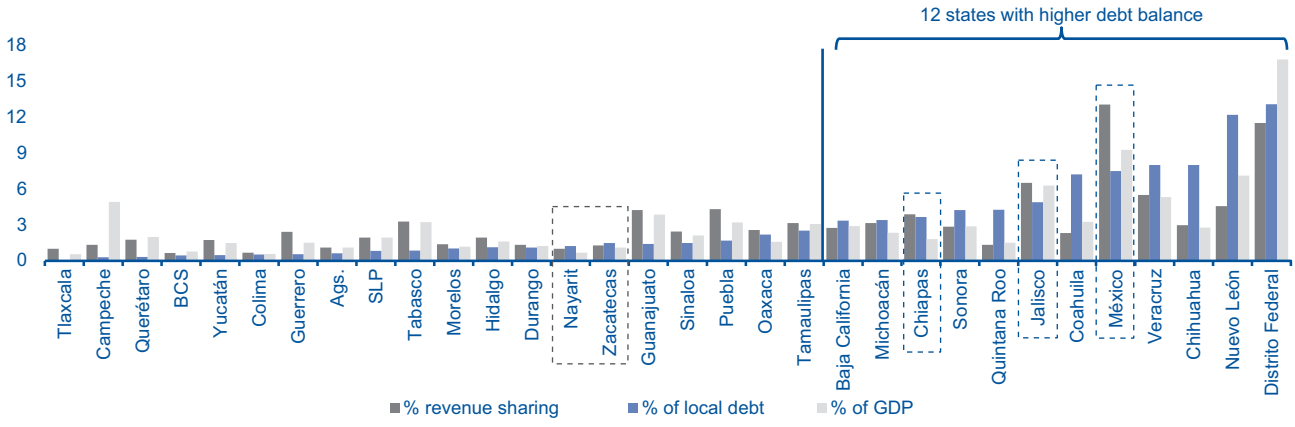
Figure 3.a.26
Distribution of debt by federal entity by type (%, Sept-15)



Source: BBVA Research with SHCP data

When we compare the percentage share of each entity within the total balance of local obligations, the percentage of revenue-sharing transfers (Branch 28) that they receive in comparison with the total and the contribution of the state GDP to national GDP, significant differences can be observed. Of the twelve states with the highest debt, only three (the Federal District, State of México and Jalisco) contribute more to the GDP than they do to total sub-national borrowing. Among the twenty least-indebted entities, the cases of Oaxaca, Zacatecas and Nayarit stand out as they contribute more to total debt than they do to national GDP (Chart 3.a.27)

Figure 3.a.27
Share of total debt per federal entity, revenue-sharing transfers (Branch 28) and GDP (%, Sept-15)



Source: BBVA Research with SHCP data

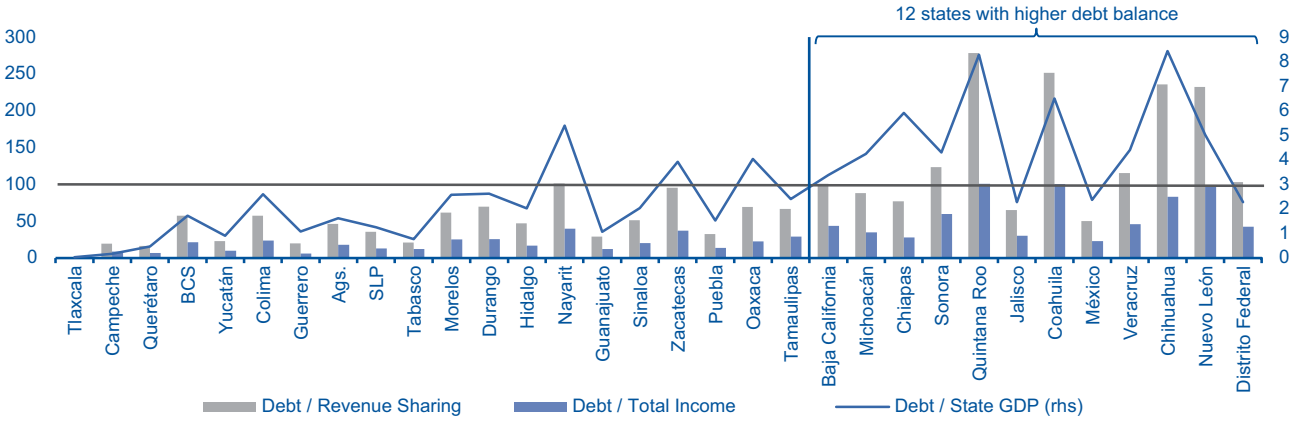
Differences can also be seen between the percentage that states receive of the total revenue-sharing transfers and their contribution to sub-national debt: among the top 12 states with the highest debt, only State of México, Jalisco and Chiapas receive a larger proportion of revenue-sharing transfers than their contribution to local debt. Among the twenty states with the lowest debts, four contribute more to total financial obligations than the percentage of revenue-sharing transfers that they receive: Zacatecas and Nayarit (Chart 3.a.27).

These differences are important because they are a relative indicator of the differences between the financial obligations of each entity and their potential sources of resources, either from freely available federal transfers or by taking GDP as the basis for assessing the potential to increase local revenues through greater receipts. Hence, ten of all the federal entities are striking because their contribution to GDP and the percentage of the revenue-sharing transfers they receive is less than the percentage of financial obligations in comparison with the total (in these cases, the blue bar is larger than the grey bars in Chart 3.a.27): Nayarit, Zacatecas, Baja California, Michoacán, Sonora, Quintana Roo, Coahuila, Veracruz, Chihuahua and Nuevo León.

If we analyse the debt of each federal entity as a percentage of the different measures of income and of state GDP, we can identify entities in which the local debt could imply pressures given their revenue flow. Eight of the twelve most-indebted entities have a debt of over 100% of their revenue-sharing transfers, and in four of them (Quintana Roo, Coahuila, Chihuahua and Nuevo León) the balance of their obligations is more than double the flow they receive in revenue-sharing transfers. The local debt in this group also represents more than 100% of total revenues in the case of Quintana Roo and Coahuila. Among the remaining twenty federal entities, only Nayarit has a debt balance of over 100% of its revenues from investment income, and no entity of this group has a debt balance that exceeds their total revenues (Chart 3.a.28).

The distribution of debt in comparison with state GDP shows similar behaviour to the local debt to revenue sharing ratio: the states with a debt of over 100% of revenue sharing frequently present a higher-than-average debt to state GDP ratio (2.9%). This is the case for Nayarit, Baja California, Sonora, Quintana Roo, Coahuila, Veracruz, Chihuahua and Nuevo León (Chart 3.a.28).

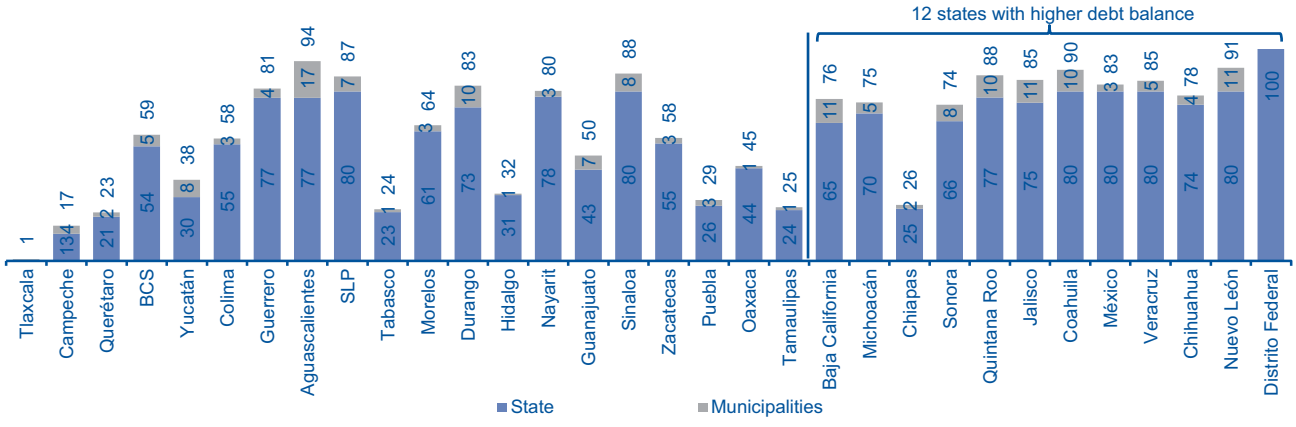
Figure 3.a.28
Debt as a proportion of revenue-sharing transfers, total revenues and state GDP (%, Sept-15)



Source: BBVA Research with SHCP data

Finally, if we look at the details of the revenue-sharing transfers affected to debt payment, among the twelve entities with the highest debt, only Chiapas has less than 70% of its revenue-sharing transfers affected, while Coahuila and Nuevo León reach 90% or more. Among the states with the lowest debts, Aguascalientes, San Luis Potosí and Sinaloa have over 85% of their revenue-sharing transfers affected (Chart 3.a.29).

Figure 3.a.29
Percentage of revenue-sharing transfers covered (%, Sept-15)



Source: BBVA Research with SHCP data

Although the available statistics are not sufficient to assess the degree of pressure that debt generates on local entity finances, the imbalances identified between borrowing and share of GDP or the percentage received from revenue-sharing transfers (Branch 28), together with the available indicators on balances and their relation to different measures of income (revenue sharing) and economic activity (state GDP) suggest that the level of borrowing of some entities could limit the margin for manoeuvre that they have with their local finances.

A full analysis to assess the sustainability of local debt would require additional uniform indicators of budgetary balances and debt servicing (payment of interest, depreciations and amortisations and other costs), apart from a record of short-term obligations that are not currently available.

3.a.5. Financial Discipline for Federal and Municipal Entities Act (LDFEFM)

On 17 August 2015, the Executive presented the LDFEFM bill, which was passed by the Chamber of Deputies on 3 December and sent to the Chamber of Senators, so it is expected to be enacted and published shortly. The bill contains a set of measures regulating borrowing by local entities, the constitution of a single debt registry and the introduction of a system of alerts that allow a timely detection of the risk of indebtedness. The main measures include:

1. Contracting financing and obligations. The approval of three-quarters of the local legislature shall be required, after analysing the payment capacity of the public body, and the principle of contracting under the best market conditions must be applied with competitive processes that seek alternatives that offer the lowest financial cost. There are also provisions for contracting short-term financing to cover liquidity deficits, with a limit in comparison with total revenues.
2. Guaranteed State Debt. This contemplates the possibility of the Federation granting guarantees in order to support states and municipalities in reducing the interest rate of their loans. In exchange, the states and municipalities must sign financial discipline agreements.
3. Single Public Registry. Its purpose is to make all the obligations of local governments and entities transparent. An important element is that the SHCP is empowered to reconcile the information from the registry with the information from financial institutions obtained through the National Banking and Securities Commission, and in the event of differences being found they must be published, constituting an exception to banking, stock market, guarantor secrecy and other variants of financial secrecy.
4. System of Alerts. This will be linked to levels of borrowing, debt servicing and liquidity conditions of the public bodies. It is derived from the classification based on a range of indicators that seek to assess the sustainability of the debt, capacity to pay and liquidity, and entities will have access to different annual financing ceilings.

The enactment of the law will help to achieve a responsible use of sub-national borrowing. Apart from the transparency required in the processes of contracting and the requirements of disclosing information, there are mechanisms of co-responsibility put in place between the different levels of government, and borrowing ceilings are linked to the performance of local public finances. This will help to achieve coherence between levels of borrowing and the capacity to pay of the respective entities. On the other hand, these measures could modify the dynamic observed in the growth of local debt. It will be of particular importance to know more about the classification methodology of the system of alerts, which will be a useful tool for identifying which local public bodies are eligible to increase the level of their borrowing, without putting their budgetary balances at risk, and which will require corrective measures.

3.a.6. Conclusions

Even though the local debt represents a low percentage of GDP as a whole, for some entities it represents more than 200% of their local revenues or the revenue-sharing transfers that they receive from the Federation, which are the principal source of financing for debt service.

At some entities, the level of borrowing is incompatible with the proportion of resources that they receive from the Federation through revenue sharing, or with their contribution to national GDP. Inter alia, this indicates a limited flexibility to respond to pressures on their budgets.

Although to date there have been no failures to meet obligations, even in periods in which revenue-sharing transfers have declined, the percentage of these transfers that is compromised to pay debt service is an indicator of the reduced room for manoeuvre of the sub-national governments, as by allocating the resources from the Federation to prioritise debt service, they only receive the rump, which could eventually affect their capacity to meet other operating expenditure and contingencies.

The contribution of oil revenues to the RFP has fallen considerably in the last year. However, the momentum in tax revenues driven by excise taxes on gasoline and the inclusion of the income tax of local employees in shared revenues has managed to offset this decline, such that in the future the performance of these components will be relevant to evaluate the stability of the principal source of guarantee for sub-national financial obligations.

Although a considerable part of the debt service is guaranteed by administration and payment mechanisms, the reduced capacity of the local entities to increase their own revenues - and a smaller rump of resources after debt service - could, in some cases, put pressure on them to reduce expenditure at a local level, or to increase debt. Given their current total borrowings, and in view of the new regulations that will come into force with the approval of the LDFEFM, some entities could find themselves with little room to expand their resources by taking on more debt.

3.a.7. References

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3.b. Mexican corporate borrowing in foreign currency: recent trends and analysis of the effect of the depreciation of the exchange rate

3.b.1 Introduction

In the period after the global financial crisis of 2008, non-financial companies in emerging markets increased their leverage in foreign currency (FC) on the back of low dollar interest rates due to the Federal Reserve's expansionist monetary policy. The International Monetary Fund's latest Global Financial Stability Report reveals that the total corporate debt (local and foreign currency) increased four-fold in the emerging countries between 2004 and 2014 (from USD4trn to over USD18trn). Mexico was no exception to this trend, as in 2004-14 the total balance of Mexican company financing rose, especially financing denominated in FC, which more than doubled from USD61bn to USD148bn.

The backdrop of low international interest rates, the relative stability of the exchange rate and the environment of macroeconomic strength that Mexico has enjoyed gave Mexican companies low-cost access to external resources for a while, however, the recent rise in interest rates in the United States and, above all, the significant depreciation of the exchange rate has increased the value of the debt in FC, putting greater pressure on their fundamentals.

This chapter analyses Mexican FC corporate financing, its characteristics and those of the companies that have acquired it, using information from a range of sources, including the Bank of Mexico, the National Banking and Securities Commission (CNBV, as it is known in Mexico) and the Mexican Stock Exchange (BMV, as it is known in Mexico). The financial reports that companies deliver in a quatertly basis to BMV are the main input to measure the effect of exchange rate depreciation on firms' fundamentals, in order to determine if this depreciation could represent a systemic risk or if it has only affected firms with certain characteristics. Additionally, we measure exchange-rate exposure using information on share prices of some issuers and relate this exposure to firms' characteristics.

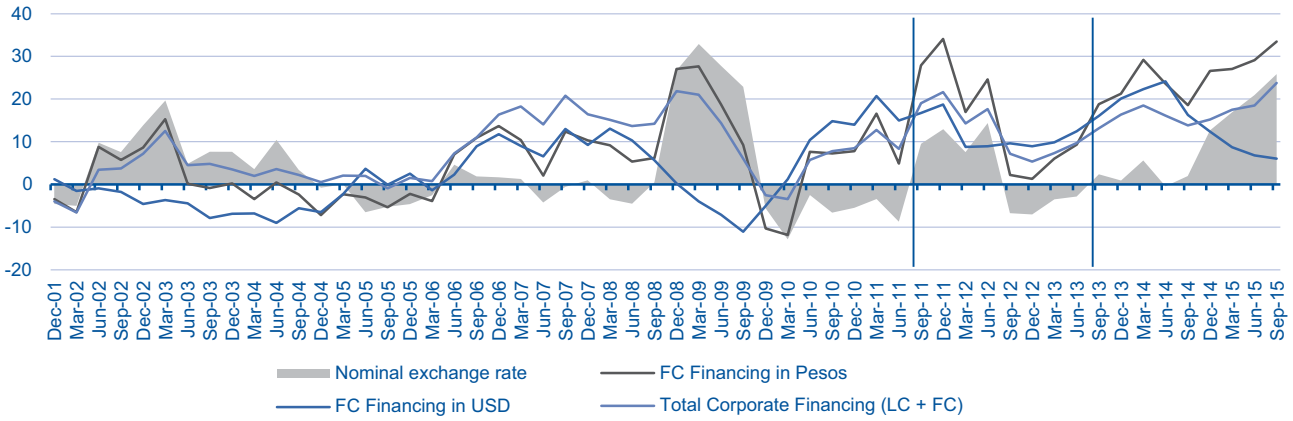
There have been several studies on this issue recently, but most of them were international analyses. With the exception of the 2014 and 2015 Reports on the Financial System published by the Bank of Mexico, which briefly analyse the issue, to date there has been no diagnosis of how this kind of funding has evolved in Mexico, nor of the repercussions that the depreciation of the exchange rate has had on it. We believe that it is important to study this issue from a financial stability perspective.

3.b.2 Sources of borrowing in foreign currency

According to the Bank of Mexico, at year-end 2015 the balance of Mexican corporate financing in foreign currency (FC) amounted to 2.5trn pesos, or just over USD148bn at the exchange rate of the time. This financing has been highly dynamic since 2013, initially as a result of greater borrowing in dollars and later due to the depreciation of the exchange rate. As shown in Figure 3.b.1, from March 2013 to June 2014, the increase in the balance of financing in FC valued in pesos and its valuation in dollars was practically the same. During this time, both grew at an average nominal annual rate of 18%, against a backdrop of an exchange rate with a nominal average annual increase of only 0.4%. In the second half of 2014, however, the exchange rate began to depreciate and although borrowing valued in dollars started to flatten off, its value in pesos obviously increased, to a nominal annual rate of 33.5% by September 2015, when the exchange rate showed a nominal depreciation of 25.8% year on year. Consequently, total corporate financing (local currency + foreign currency) showed a nominal annual growth of 24% at the end of the third quarter of 2015 (3Q15). Of total growth, 18 percentage points (pp) were due to the growth of financing in FC valued in pesos. As a result, financing in FC

accounted for 57% of total corporate financing (Figure 3.b.2), one of the highest figures on record since 2002 (59% in December of that year).

Figure 3.b.1
Corporate financing (in foreign currency and total) and exchange rate. Nominal annual growth, %



Source: BBVA Research with the central bank data

There are four main sources of financing in FC (Figure 3.b.2). The first two come from financing abroad. These are stock market debt issued abroad and loans granted by financial intermediaries abroad. The next two come from domestic financing: loans granted in Mexico by commercial and development banks denominated in FC. The largest of the four is stock market borrowing: in September 2015, 28% of total corporate financing came from this source. It was followed by loans granted abroad (16.5%) and loans granted in Mexico in FC by commercial banks (8.8%) and development banks (2.8%).

Figure 3.b.2
Financing in FC as % of total corporate financing

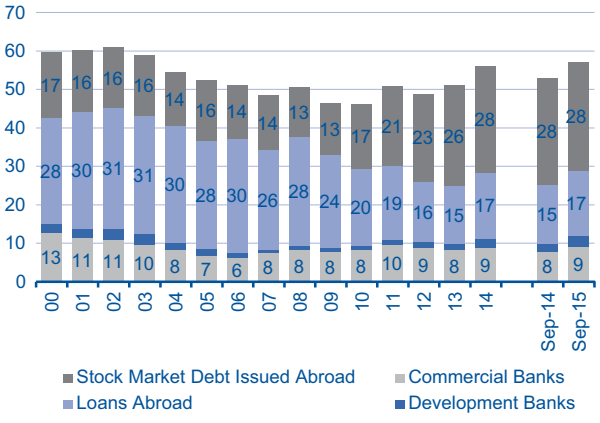
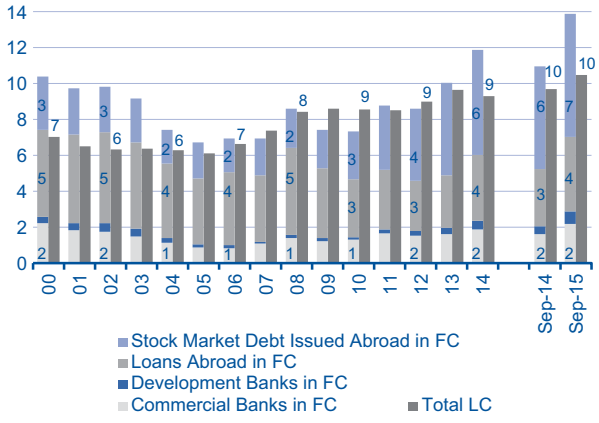


Figure 3.b.3
Financing in FC as % of GDP



Source: BBVA Research with the central bank and INEGI data

With respect to GDP, financing in FC has also increased. In September 2015, it represented 13.8%, which was greater than the penetration of financing in pesos (10.4%) (Figure 3.b.3). Furthermore, corporate debt in FC abroad is greater than the loans granted by the banking sector to households in the country: in September 2015, consumer and housing loans accounted for 7.4% of GDP, while stock market debt issued abroad and overseas loans to companies were equivalent to 11.0% of GDP.

As in some other emerging countries (Figure 3.b.4), the penetration of external financing to GDP grew sharply in Mexico after 2008. Peru and Chile were the Latin American countries with the most overseas financing between 2008 and 2014, with increases in penetration of 5.1 and 4.4pp of GDP respectively. These were followed by Mexico, Colombia and Brazil, with increases of 3.5, 2.3 and 1.4pp of GDP respectively. Other countries such as Turkey and Russia have reduced their penetration (2.1 and 1.3pp respectively) and others, such as China and India have increased the penetration, but to a lesser extent (1.2 and 1.0pp respectively). Overseas financing is led by stock market borrowing, where, as Figure 3.b.5 shows, several countries - such as Turkey, Peru, Colombia, China, Mexico, Chile and Brazil – recorded sharp growth after the financial crisis (2008-13); although some of them have reduced this growth in 2014 compared with previous years.

Figure 3.b.4
Private, non-financial sector external financing as % of GDP. International comparison*

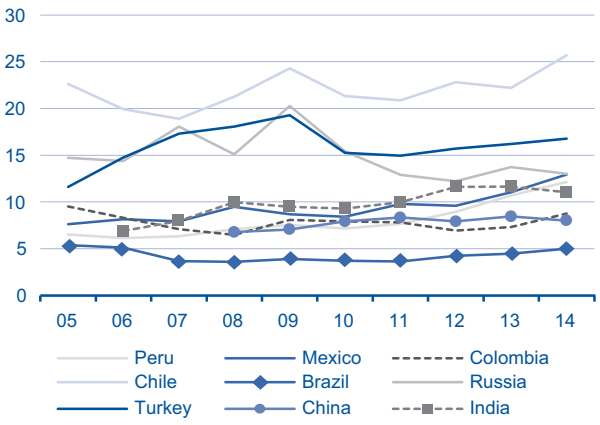
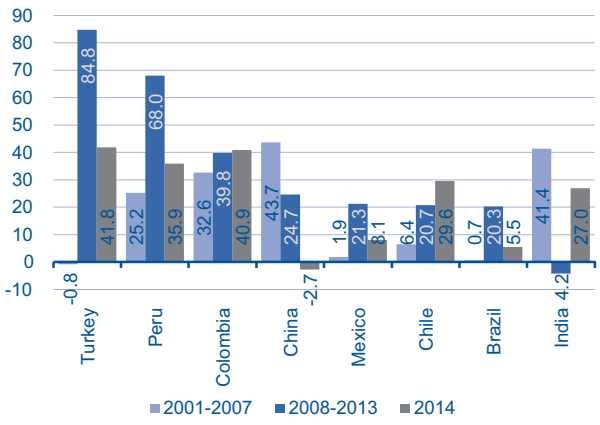


Figure 3.b.5
Private, non-financial sector stock market borrowing. Average nominal annual growth in dollars

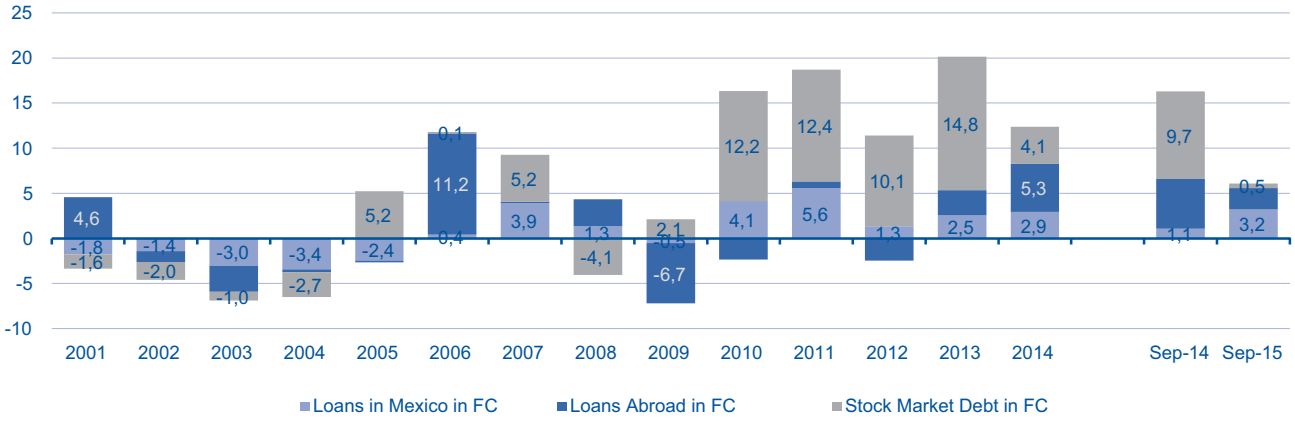


Source: BBVA Research with World Bank and BIS data. Data for Mexico: Bank of Mexico, World Bank and INEGI. *Includes trade credit

3.b.2.a Stock Market Debt

As with companies from emerging countries, the backdrop of low interest rates in the developed countries and an increase in liquidity among international investors helped more Mexican companies to borrow on the stock market easily and at lower costs. By breaking down Mexican corporate financing behaviour into its main sources, we can confirm that stock market borrowing made the largest contribution to the growth of financing in FC in 2009-14. For example, in September 2014, this contributed 59.5% of the growth seen during that month against the same period the year before (9.7 pp to the rate of 16.3%), while the contribution was lower in September 2015 (9.9% or 0.5pp), and it was exceeded by loans in FC granted by banks in Mexico.

Figure 3.b.6
Contribution to the growth of financing in FC valued in dollars



Source: BBVA Research with data from Bank of Mexico

Since 2008 there has been a continual increase in debt issues abroad. In some years it has been greater than the equivalent amounts issued in Mexico in local currency (LC) (Figure 3.b.7a). There was also an increase in debt issues with speculative ratings, i.e., less than BB on the global scale (Figure 3.b.7b), however most of the issues were at a fixed rate and with long-term maturities, thus limiting additional risks, such as liquidity and interest rate risks (Figure 3.b.7c).

Non-financial company borrowing. Billions of dollars

Figure 3.b.7a
Borrowing in local and foreign currency

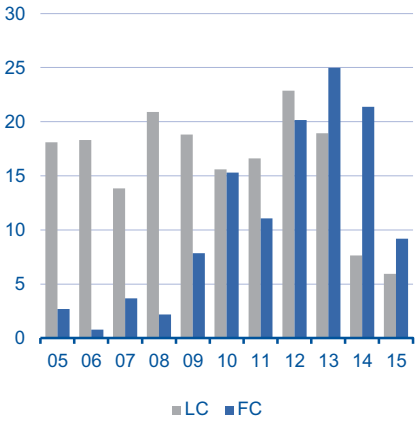


Figure 3.b.7b
By initial credit rating

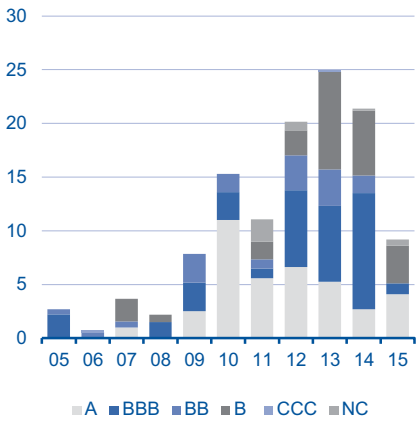
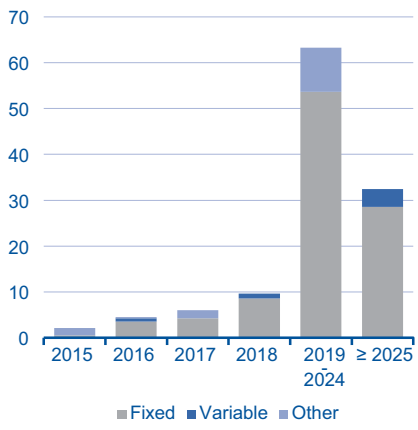


Figure 3.b.7c
By coupon rate and maturity date



Source: BBVA Research with Bloomberg data

3.b.2.b Bank loans

The second largest source of funding in FC was bank loans, both those granted by overseas banking institutions and those granted by banks in Mexico. The financial information that issuers report to the BMV tells us the amount of the loans that they have obtained from national and foreign banks and some of their characteristics. To do this, we obtained information from a sample of 94 issuers for 4Q13-3Q15, from which 78 reported having

bank loans in FC during this period.[1] As shown in Figure 3.b.8, the balance of bank loans in FC has increased continually: while 49% of bank loans were denominated in FC in 4Q13, it increased to 61.7% by 3Q15.

Most of the loans in FC have been granted by foreign banks (Figure 3.b.9) and, as with stock exchange borrowing, most of them (55.9% of the total balance) have a maturity date of three years or more, which reduces liquidity pressure on companies. However 18.5% of the balance of loans in FC matures in less than a year, so it is important to assess the capacity of these companies to cover these obligations.

Figure 3.b.8
Bank loans in LC and FC granted by national and foreign banks (MXN bn)

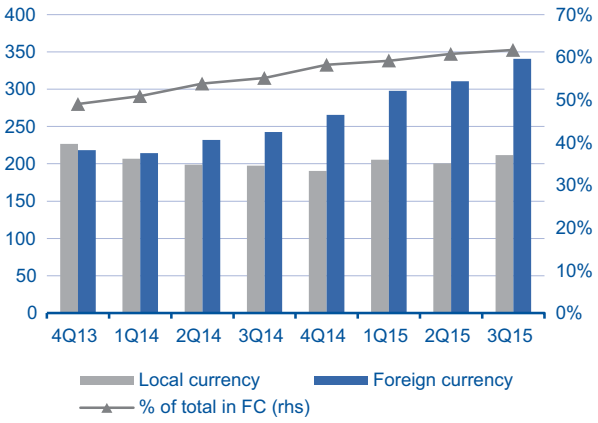
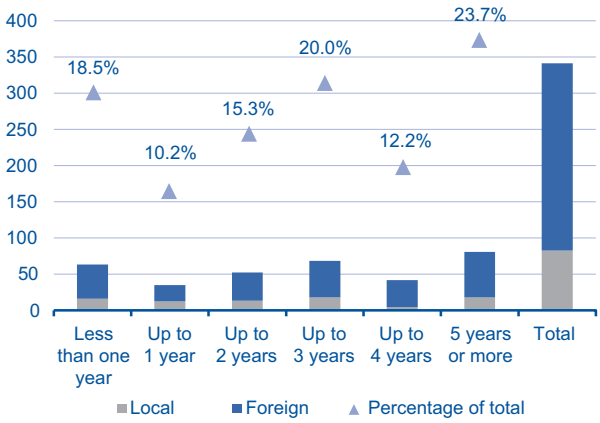


Figure 3.b.9
Balance of bank loans in FC by maturity and kind of institution 3Q15 (MXN bn)



Source: BBVA Research with BMV data

Information from the Bank of Mexico on loans granted by Mexican banks to all companies shows that the balance of outstanding credit in FC granted by commercial banks to companies between November 2014 and September 2015 increased at an average nominal rate of 27.8%. In September 2015, the increase in nominal terms against September 2014 was 42.5%, the highest figure since January 2008. Around three-quarters of this increase was due to a valuation effect,[1a] but it was also the consequence of continual borrowing in dollars, as its growth is greater than the growth of the debt in pesos (Figure 3.b.10). Consequently, by September 2015 the domestic banking sector increased its share of bank loans in FC as a total of the outstanding total to 25.8% (Figure 3.b.11). For now, however, no impairment has been observed in the quality of the FC portfolio, as the Non-Performing Loan Index (IMOR, as it is known in Mexico) of the portfolio is less than the total IMOR (0.6% vs 3.1%), and the trend has been downwards since the second half of 2012 (Figure 3.b.12).

[1] Although these companies are not the entire population on Mexican issuer companies, they are the largest and they are the ones with the largest foreign footprints, so they are the ones that would be expected to borrow more in FC.
[1a] If the exchange rate had remained at the same levels as in the first half of 2014 (around 13 pesos to the dollar), average nominal growth of corporate financing from banks would have been 7.6% between November 2014 and September 2015, and the increase would have been 10.7% at the close of 3Q15.

Figure 3.b.10
Balance of outstanding bank loans to companies and exchange rate nominal annual growth %

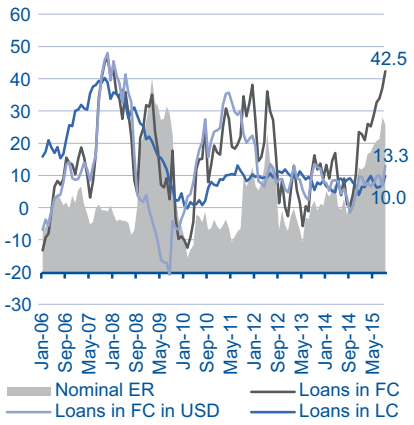


Figure 3.b.11
Balance of outstanding bank loans in foreign currency and % of total outstanding loans to companies and self-employed

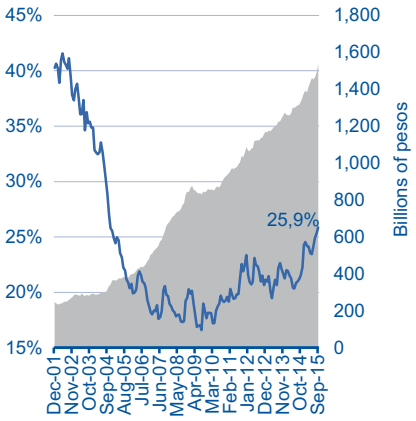
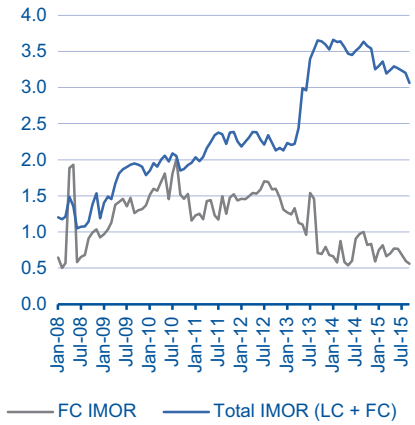


Figure 3.b.12
Corporate non-performing loan index (IMOR). Loans in FC and total loans



Source: BBVA Research with the central bank data

3.b.2.c Trade credit

Apart from stock market borrowing and bank loans, companies also obtain financing from other companies that supply them. In other words, supply companies grant their customers a certain amount of time to pay for the goods and services bought from them, so the payment obligation becomes a liability on the books of the companies that buy them. This type of financing is also known as trade credit and in Mexico it has a significant share in the corporate liability mix, albeit smaller than other sources of funding. According to Bank of Mexico data, the supplier loan balance in September 2015 amounted to MXN475bn, accounting for 9.8% of total corporate financing and 2.6% of GDP.

It can be expected that some companies obtain part of their inputs from importers, and that these importers grant credit denominated in FC. The information published by the Bank of Mexico on supplier loans does not allow us to break down this kind of funding into different currencies, but our sample of issuers that report to the BMV does give us some of their characteristics. All the companies from our sample reported having trade credit, and the balance of this debt in FC in 3Q15 was just over MXN224bn (USD13bn), accounting for 7.5% of their total financing (LC+FC) and 11.7% of their FC borrowing. As Figure 3.b.13 shows, the share of supplier finance in FC financing is lower than for stock market borrowing (58.6%), bank borrowing (17.7%) and other interest-bearing liabilities (12.1%). This mix is different from the LC financing mix, as here trade credit has a 28.0% share, second only to stock-market borrowing (38.3%). Figure 3.b.14 shows that the share of trade credit of total FC financing has fallen in recent years, whereas stock market borrowing and bank loans have gained ground to a certain extent. Regarding the nationality of the supply companies and the term of the loans in FC that they grant, most of the credit (86.5%) is granted by Mexican companies and they mature in one year or less (Figure 3.b.15), in striking contrast with bank loans and stock-market borrowing which have longer terms.

Figure 3.b.13
Distribution of financing sources of the issuing companies 3Q15, %

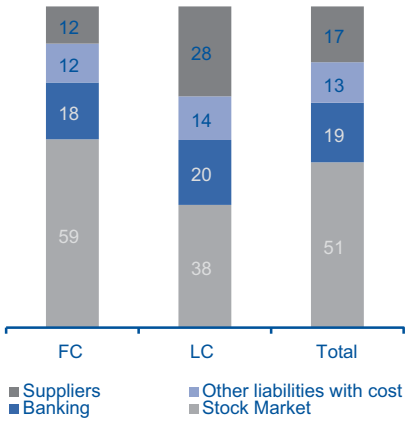


Figure 3.b.14
Distribution of the FC financing of issuing companies, %

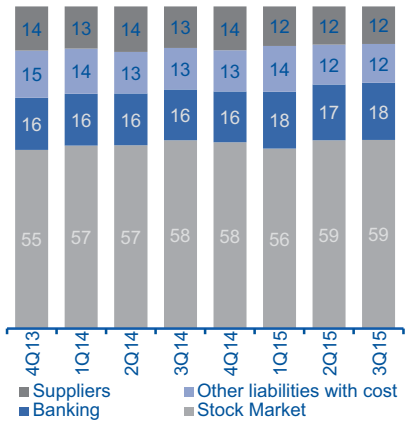
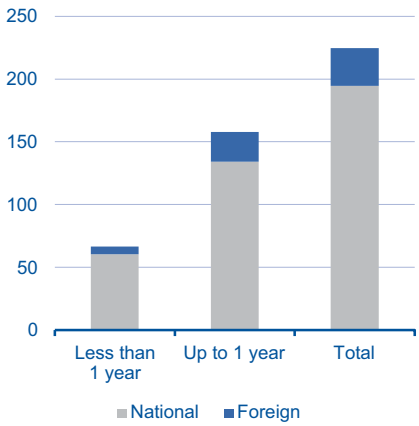


Figure 3.b.15
Supplier financing in FC by maturity and nationality of the company granting it (MXN bn)



Source: BBVA Research with BMV data

3.b.3 Profile of companies borrowing in foreign currency

It can be expected that large companies have a higher percentage of their debt in FC in comparison with smaller ones, since they could have larger operations in other countries, and part of their sales and their assets could be denominated in one or more currencies.

CNBV information on corporate loans granted in FC by banks in Mexico allows us to corroborate this statement. The data for September 2015 indicates that 34.1% of the total balance of corporate loans to large companies is denominated in FC, while for medium-sized companies it is only 9.6%. Micro and small enterprises account for an even smaller percentage of borrowing in FC: 2.5% and 4.5% respectively (Figure 3.b.16).[1b]

The Bank of Mexico publishes information on the balance of loans granted by commercial banks to companies by business sector that they belong to. Companies form the services and manufacturing sectors concentrate most of the balance of corporate loans in FC, with shares of 41.2% and 39.6% respectively (Sept-2015). In September 2015, the share of these sectors was 41.2% for the services sector and 39.6% for the manufacturing sector. These are followed by the construction sector, with a share of 15.0%, and finally the agro-livestock and mining sectors, with 2.7% and 1.5% respectively (Figure 3.b.17).

It is striking that the services sector is the one that accounts for the largest portion of loans in FC as they are not export companies per se. But, when these companies are analysed in detail, it turns out that over half of the loans (53.9%) have been granted to shops, restaurants and hotels or real estate companies. These establishments typically obtain revenues in FC from foreigners visiting the country for tourism, business or to set up in Mexico, and these revenues could naturally cover debt servicing. The leading companies in the manufacturing sector are the typical export sectors: commodities producers (28.9 % of the total balance of the sector), food producers (21.6%), automobile manufacturers (17.2%) and cement plants (10.8%).

[1b] The CNBV uses the Secretary of Economy's definition for company size, which is determined from a score obtained from the following formula: company score = (Number of employees X 10%) + (Amount of annual sales X 90%). This should be equal to or less than a maximum ceiling in accordance with each category of company size. For further details, consult: http://economia.gob.mx/files/marco_normativo/A539.pdf

Construction companies are the ones that have increased their share the most over time, from 4.2% in December 2000 to 15.4% in December 2014. Most of the balance in this sector (68.2% in December 2014 and 68.4% in September 2015) is concentrated in companies carrying out engineering works, which probably lever the environment of low interest rates to take out loans in FC, with the expectation of obtaining higher revenue flows in the future.

Figure 3.b.16
Percentage of the bank loan balance in FC by size of company

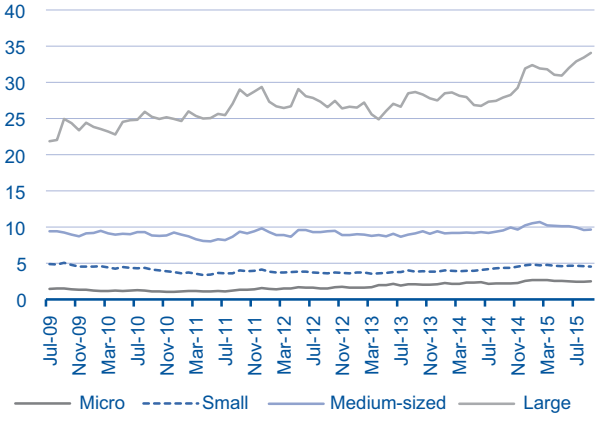
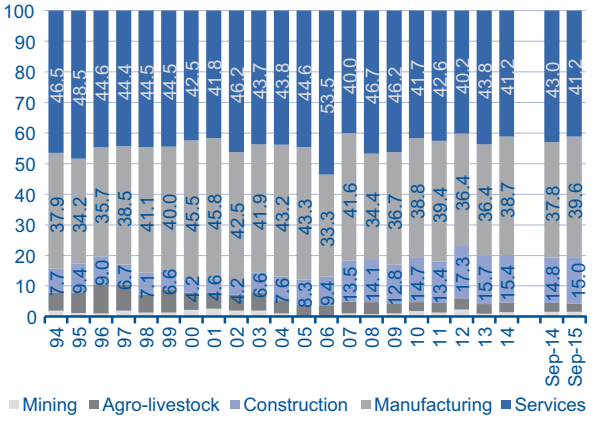


Figure 3.b.17
Distribution of the bank loan balance in FC by business sector



Source: BBVA Research with CNBV and the central bank data

On the other hand, the information from BMV issuers allows us to compare the performance, level and kind of funding in FC by companies' economic sector. It also tells us whether this level and behaviour is consistent with the revenues obtained from abroad. Figure 3.b.18 shows the percentage of liabilities in FC against total liabilities over time, while Figure 3.b.19 shows the share of sales overseas against total sales. Both figures show several differences by economic sector, although there is a certain consistency between them with respect to FC borrowing and overseas sales.

First of all, we can see that the Materials sector has the highest concentration of liabilities in FC, just over 70%. This result is expected as the sector includes mining companies, metal works, cement factories and producers of inputs such as paper, plastic and other chemicals. Most of these are export companies, as most of their sales (around 63%) come from abroad, so their level of borrowing in FC seems to be consistent with the level of sales. This sector is followed by Telecommunications and Energy as the sectors with the largest concentration of financing in FC. Telecommunications sector, which includes providers of telephone and television services, also has a high percentage of sales abroad (over 50%), both through their subsidiaries and from exports. Energy sector comprises a single company, which forms part of a multi-national devoted to the construction and operation of energy infrastructure. This sector has a lower percentage of sales overseas than the two previous ones (around 24.2%) and it has fallen over time, while the share of its liabilities in FC has increased. Seems to be the only sector that shows inconsistencies in both variables.

In third and fourth place in terms of concentration of liabilities in FC are the Frequent Consumption and Industrial sectors. The former includes both supermarkets and companies that produce and sell basic foodstaples (sausages, dairy produce, eggs, bread, etc.), while the latter encompasses companies from airport groups to conglomerates, including infrastructure and real estate developers, etc. A significant concentration of liabilities in FC can also be seen in these sectors (40-50%) although they could also be considered in line with their share of sales overseas, with percentages of around 30% and 40% respectively.

Finally, we have the non-basic Goods and Services sector and the Health sector. The former includes companies that operate hotels, restaurants and gyms, along with durable consumer goods shops, including department stores. The Health sector is comprised mainly of pharmaceutical companies, pharmacies and hospital operators. These sectors concentrate a lower percentage of liabilities in FC and also, a lower percentage of sales overseas. Over time, these sectors also show clearly consistent behaviour between borrowing and sales in FC.

Figure 3.b.18
Liabilities in FC against total liabilities by economic sector, %

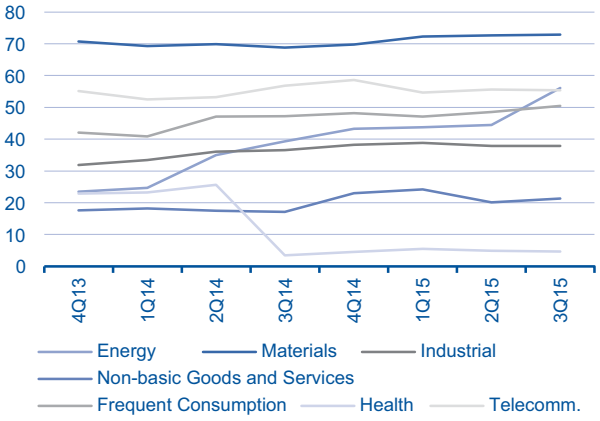
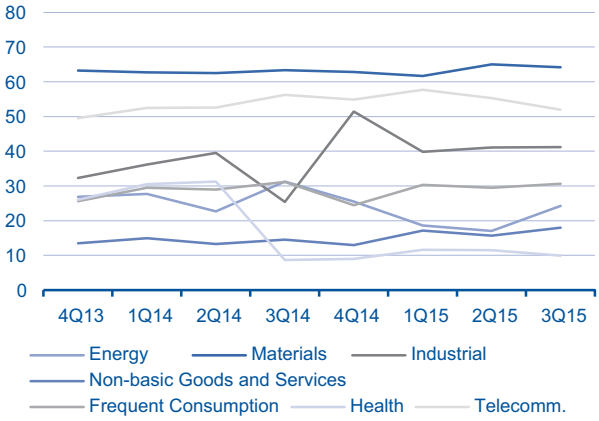


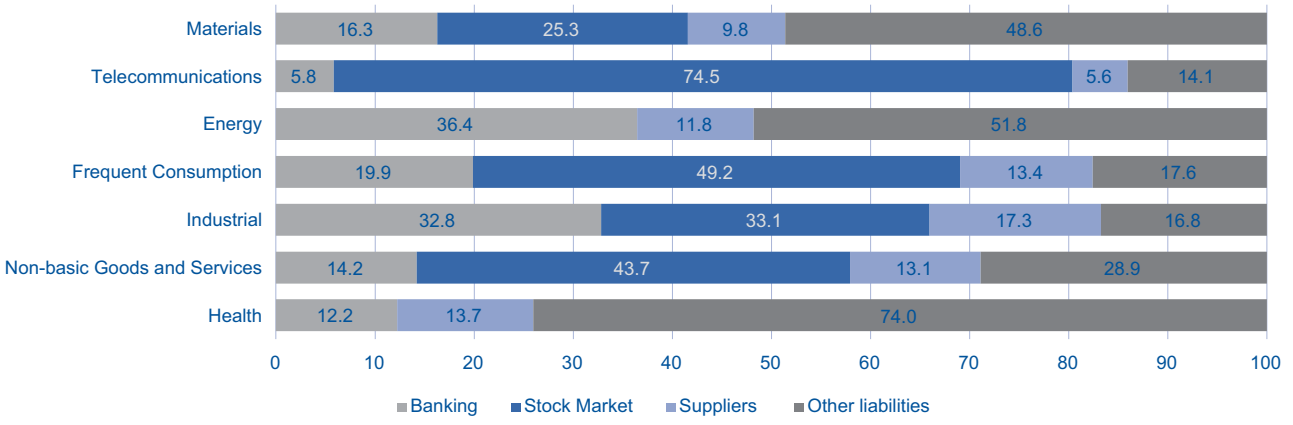
Figure 3.b.19
Amount of sales overseas against total sales by economic sector, %



Source: BBVA Research with BMV data

The sources of funding in FC also vary depending on the business sector in question. Figure 3.b.20 shows the distribution of debt in FC broken down by kind of funding in 3Q15. This shows that for the Materials, Energy and Health sectors, most of the debt in FC consists of other liabilities. Unfortunately, it is impossible to know the details of these liabilities, except perhaps for the Energy sector because, according to the company's financial report, most of these resources were granted by the parent company, which is based abroad. The second largest source of funding for these sectors varies. In the Materials sector, it is stock-market borrowing; in the Energy sector, bank loans and in Health, trade credit. There is a high concentration of stock-market borrowing in the Telecommunications sector, and other liabilities to a lesser extent. The Frequent Consumption, Industrial and non-basic Goods sectors show a greater diversification of their liabilities, although the main source of funding for all of them is stock-market borrowing and in the case of the first two, the second source of borrowing is bank loans.

Figure 3.b.20
Distribution of funding in FC by kind of debt and economic sector 3Q15, %



Source: BBVA Research with BMV data

In short, the figures suggest that the level and kind of Mexican FC corporate borrowing varies depending on the size and the economic sector in which they operate. Large companies in particular tend to have a higher percentage of debt in FC than SMEs. Furthermore, companies offering easily-tradable goods and services and that could therefore have a higher percentage of sales overseas, also have a higher concentration of debt in FC. As we shall see later, the economic sector and type of financing are also decisive with respect to the impact that movements in exchange rate can have on the performance of these companies.

3.b.4 Recent behaviour in the composition of Mexican corporate financing

Due to the backdrop of a depreciating exchange rate and expectations of an interest rate hike in USA, it is possible that Mexican companies are diminishing their share of borrowing in FC or modifying the sources that provide them with this kind of financing (from foreign to domestic banks for instance). This section briefly analyses the recent changes seen in the composition of Mexican corporate debt based on the information from the BMV sample of issuers.

The figures show a certain downward trend in liabilities denominated in FC against total liabilities. Figure 3.b.21 shows that the average company increased financing in FC against its total liabilities in 2014 and up to 1Q15. From 2Q15, this share falls, such that by 3Q15 the average company had a FC financing balance equivalent to 23.6% of its total liabilities. The data from the Bank of Mexico for all companies support the hypothesis of reducing liabilities in FC, as the solid navy blue line of Figure 3.b.1 also suggests a slowdown in the rate of growth of the balance in FC from the second half of 2014.

If these companies have reduced the share of their debt denominated in FC, then they could be replacing their needs for resources with finance in LC. It appears from the figures that this behaviour can also be observed. Figure 3.b.22 shows the change in funding denominated in local and foreign currency between 3Q14 and 3Q15. The changes in financing in LC are shown on the horizontal axis, and the financing in FC on the vertical axis, both as percentages of liabilities. The dots to the right indicate issuers that have increased their share in LC and the dots to the left are those that have decreased it. The dots towards the top are issuers that have increased their share in FC and towards the bottom, those that have reduced it. The fitted line between the two variables has a negative slope, indicating that companies tended to reduce the share of their financing in FC and increased their funding in LC between 2014 and 2015.

Figure 3.b.21
Financing in FC as % of total liabilities

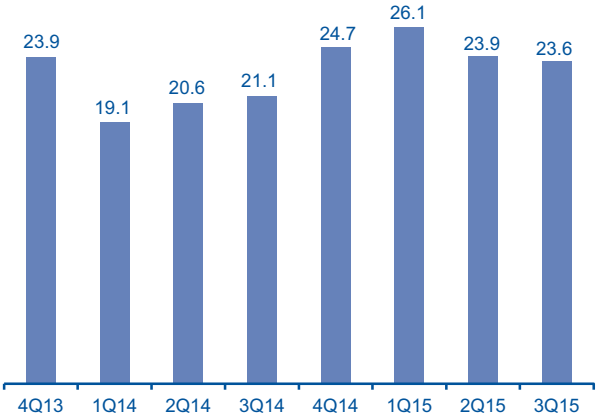
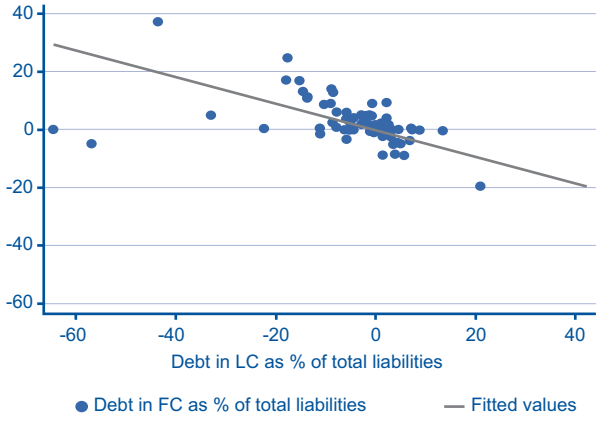


Figure 3.b.22
Change in financing in FC as % of total liabilities 3Q14 vs 3Q15, percentage points



Source: BBVA Research with BMV data

An additional measure that illustrates the possible shift from debt in FC to debt in LC is the simultaneous percentage change in the balance of the debt by type of financing (FC and LC) between 3Q14 and 3Q15. Table 3.b.1 shows the number of companies with simultaneous changes in debt and the average percentage of their funding balance in FC and LC for each kind of finance: bank, stock market, trade credit and other liabilities. Panel A shows the companies that have reduced their balance in dollars and maintained or increased their balance in pesos. Panel B shows the companies that did the opposite (they reduced the balance in pesos and maintained or increased the balance in FC). Panels C and D show the companies that increased or reduced the balance in both at the same time and, finally, panel E shows the companies that made no change.

Table 3.b.1
Companies with simultaneous changes in debt 3Q14 vs 3Q15. Number of companies and average percentage change (%)

Type of finance	A. Reduced balance in FC and maintained or increased balance in pesos			B. Reduced balance in pesos and maintained or increased balance in FC			C. Increased both			D. Reduced both			E. No change
	Number of companies	% change of debt in FC	% change of debt in pesos	Number of companies	% change of debt in FC	% change of debt in pesos	Number of companies	% change of debt in FC	% change of debt in pesos	Number of companies	% change of debt in FC	% change of debt in pesos	Number of companies
Bank	12	-20.1	23.2	21	33.4	-34.7	22	39.7	34.0	17	-13.9	-29.3	22
Stock market	10	-7.5	18.7	12	0.3	-17.6	24	0.7	12.4	5	-4.8	-23.9	43
Trade credit	28	-16.3	24.5	17	33.8	-17.0	40	29.5	19.1	9	-22.0	-43.1	1
Other liabilities*	25	-14.7	19.1	19	80.7	-12.9	39	13.6	36.0	11	-28.7	-6.0	0
Total	**28**	**-8.8**	**16.8**	**15**	**18.2**	**-16.9**	**35**	**18.2**	**27.5**	**16**	**-5.2**	**-17.0**	**0**

Source: BBVA Research with BMV data

The table shows that all 94 companies from the sample showed changes in their financing, sixty of which reduced debt of some kind (panels A, B and D). The number of companies that reduced debt in FC (45 companies, panel A + panel D) was greater than those that reduced their financing in pesos (31 companies, panel B + D). Among those that reduced their balance in FC and maintained or increased their balance in pesos (29 companies: panel A) the change in percentage in pesos was greater than the reduction in FC (16.8% vs -9.7%) and the main change in both the number of companies and the percentage came from trade credit. Among the companies of panel B, the increase in debt in FC was similar to the reduction in debt in pesos (18.2% vs

-16.9%) and in this case, most of the companies replaced bank loans. Among those that showed an increase in both (panel C), the percentage growth was greater in debt in pesos and most increased their supplier loans or other liabilities. Finally, those that reduced both kinds of debt (panel D) were the smallest group and among them, the largest reduction was in debt in pesos, especially among supplier and bank loans.

In summary, the above analysis suggests that most companies are reducing their debt in FC and they seem to be replacing it with financing denominated in pesos. This could help to reduce part of the exchange rate risk that some companies could face. The rest of this article analyses this risk in greater detail using two complementary methods.

3.b.5 Exchange rate sensitivity and Mexican corporate exposure: two approaches to their measurement

The recent depreciation of the Mexican peso and the currencies of other emerging countries has aroused the interest of financial authorities, academics, analysts and international institutions to study the effect that this phenomenon could have on company fundamentals. The most recent analyses include the latest Report on Global Financial Stability by the International Monetary Fund in 2015, the quarterly reports of the BIS of September 2014 and December 2015 and the Bank of Mexico's 2014 and 2015 Reports on the Financial System. The results of the international analyses mentioned conclude that the increase in leveraging of companies in emerging markets has occurred in the more pro-cyclical sectors, particularly among companies in the construction sector (IMF, 2015). Although this increase may affect their capacity to service their debts in some countries, such as Mexico, Brazil and Russia, companies appear to have an adequate match between their assets and liabilities in FC, which may make them less vulnerable to exchange rate movements (BIS, 2014). The analyses conducted by the Bank of Mexico suggest that to date, there has been no general impairment to business fundamentals, but there are some who have seen significant deterioration in their profits, mainly those with higher rates of borrowing in FC.

In line with these studies, this section seeks to quantify the effect that the exchange rate has had on net borrowing in FC and the profitability of Mexican companies and identifies whether these effects vary depending on the characteristics of the companies. This could identify which companies could be most sensitive to additional depreciations of the exchange rate.

We use information from the sample of 94 non-financial companies that we have worked with in previous sections, which encompasses 4Q13-3Q15. The net position in forex is used as an indicator of net borrowing. This is defined as the balance of liabilities in FC minus the balance of assets, divided by equity. This measure is used by the Bank of Mexico in the 2014 Report on the Financial System. The profitability of companies is measured with two widely used indicators: Return on Assets (RoA) and the profit margin. The former is defined as net profit over assets and the latter as net profit over revenues.

These three indicators (differenced against the previous quarter) are used as dependent variables over a set of regressions that include the exchange rate and other characteristics of the companies as explanatory variables. These variables include the value of the assets (as a logarithm) with one quarter delay, a dummy variable that takes the value of one if the company uses exchange rate derivative instruments (and zero else), four dummy variables for each kind of finance (bank, stock market, suppliers and others) that indicate whether the company has a debt of this kind and dummy variables for each economic sector, including their interaction with the exchange rate.[2] The regression analysis seeks to identify whether there is a statistically significant relationship between movements in the exchange rate and the dependent variables in question, controlling for other characteristics of the company.

[2] Regressions where the percentage of sales overseas were tested as an additional explanatory variable but, given the close correlation that exists between this variable and the economic sector, it was decided to exclude it from the regressions reported here and to leave only those that include the economic sector.

One additional objective is to determine whether movements in the exchange rate have a generalised effect or if they could have a greater impact on a certain kind of company, particularly on those that could show some kind of vulnerability in their fundamentals. To do this, the regressions described above are estimated for five sets of companies: A) total; B) companies that are only net debtors in FC (liabilities in FC greater than assets in FC); C) companies that have a percentage of short-term liabilities (with maturities of one year or less) in FC equal to or greater than 10%, apart from being net debtors; D) companies with annual revenues in FC that do not cover their short-term liabilities in FC (revenue over short-term liabilities in FC less than 1), and E) companies with operating profits for one year that do not cover their short-term liabilities in FC (operating profit over short-term liabilities in FC less than 1).

Table 3.b.2 shows regressions results for the five company samples, for each dependent variable, using fixed effects by economic sector and robust standard errors. All the regressions show that the coefficients of the exchange rates are significant, as well as some dummy variables of economic sector and their interactions, which indicates that movements in the exchange rate are associated with changes in net borrowing and the profitability of companies and that these changes may vary from one economic sector to another. In general, one would expect increases (depreciation) in the exchange rate to be associated with increases in net borrowing and reductions in profitability, as an increase in debt in FC may imply greater financing costs, and if these have not been passed on to the customers, yield and profit margins may fall. In most of the regressions, the exchange rate coefficient has the expected sign, except for the RoA regression for all companies (column 2), but as the sample is restricted further, the coefficients take the expected sign, so our hypothesis about the effects of exchange rate would appear to be confirmed.

The use of exchange rate derivatives does not appear to be related to changes in borrowing and profitability, except for companies with a revenue cover in FC less than 1 (columns 10 to 12), where the coefficients are negative. This would suggest that the use of derivatives among companies with an FC flow that does not naturally cover the short-term liabilities in FC may help to reduce net borrowing in FC, although it does not necessarily help profitability.

The type of financing seems to be important only in some cases. The coefficients of the bank loan indicator variable are significant and positive in some profitability regressions (columns 3, 14 and 15). This suggests that companies that have this kind of financing are usually more profitable than those that do not, even in more adverse conditions (such as those included in sample E). The opposite seems to happen to those that have trade credit, as the companies of samples D and E have coefficients for RoA and profit margins that are negative and significant (columns 11, 12, 14 and 15). Finally, some coefficients of the stock market indicator variable are positive and significant in the net borrowing regressions, indicating that companies with the option of this kind of financing tend to be more heavily indebted in FC.

Table 3.b.2
Effect of exchange rate on net borrowing and the profitability of five sets of companies

Sample of companies	A. Total companies			B. Net debtors in FC			C. Net debtors with short-term maturities in FC > 10%			D. Net debtors with short-term maturities in FC > 10% and cover from revenues in FC <1			E. Net debtors with short-term maturities in FC > 10% and cover from operating profits <1		
	Δ Net pos. in FC	Δ ROA	Δ profit margin	Δ Net pos. in FC	Δ ROA	Δ profit margin	Δ Net pos. in FC	Δ ROA	Δ profit margin	Δ Net pos. in FC	Δ ROA	Δ profit margin	Δ Net pos. in FC	Δ ROA	Δ profit margin
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Δ Log (Exchange rate)	0.3***	78.8***	-92.5***	0.2**	-94.4***	-137.0***	0.4***	-90.9***	-126.4***	1.0***	-13.0***	-0.3*	1.1***	-49.4***	-17.7***
Economic sector															
Energy	0.0	5.0***	7.5***	-0.1**	-12.1***	-10.6***	-0.1**	-12.3***	-11.9***	0.1	5.2**	14.6***	0.1	2.9***	6.9***
Materials	-0.1***	3.0***	0.2	-0.2***	-13.9***	-20.9***	-0.1***	-14.4***	-22.7***	0.0	2.7**	4.8**	0.0	1.3	-0.5
Industrial	0.0	1.3***	-9.7***	-0.1***	-16.7***	-27.1***	-0.1***	-17.6***	-30.7***	0.1	-1.7	-10.4***	0.1	-3.1**	-10.0***
Non-basic consumption	-0.0***	2.0***	-2.1***	-0.1***	-14.3***	-20.9***	-0.1***	-14.8***	-22.6***	0.1	6.7***	14.2***	0.0	5.3***	4.7***
Frequent consumption	0.0***	2.6***	-4.4**	0.0	-15.5***	-24.6***	0.0	-16.2***	-26.8***	0.2***	2.8**	3.9***	0.2*	1.0	-6.2*
Telecommunications	-0.1***	6.5***	9.0***	-0.2***	-13.0***	-18.3***	-0.2***	-16.8***	-28.0***	-0.1	0.2	-0.3	0.1	-1.1	-5.3
Economic sector* Δ Log (Exchange rate)															
Energy	-0.1	-161.6***	-248.7***	-0.1	15.9**	-202.8***	-0.2	4.1	-234.3***	-0.4	-53.4***	-296.8***	-1.2*	-37.5***	-309.7***
Materials	0.0	-32.8***	-12.6	0.9***	51.2***	40.0***	0.8***	46.5***	27.1***	0.2	-14.9	-116.3***	0.3***	-8.1***	-105.8***
Industrial	0.2***	-68.1***	121.8***	0.8***	104.9***	145.4***	0.1	104.2***	171.0***	-1.0***	63.9***	197.0***	-0.5***	72.2***	70.1***
Non-basic consumption	0.0	-70.1***	31.8**	0.3*	48.8***	40.9***	0.1*	47.2***	37.2***	-1.1***	-84.9***	-220.0***	-0.4	-106.0***	-237.2***
Frequent consumption	-1.2***	-92.4***	94.1***	-1.1***	87.5***	140.6***	-1.3***	83.4***	129.4***	-2.0***	-12.9***	-26.5***	-4.3***	-0.2	10.1
Telecommunications	1.8***	-175.8***	-42.3**	2.8***	20.2***	-5.9	2.8***	55.6***	83.5***	2.7***	-49.3***	-99.7***	1.5***	-28.7***	-137.8***
Log (Assets) $_{t-1}$	0.0	0.0	-0.3	0.0	0.3	0.3	0.0	0.8	1.4	0.0	-0.4	-0.2	0.0**	0.7	1.1
Dummy use of derivatives	0.0	-0.3	2.9	0.0	0.0	0.3	0.0	-0.8	-1.3	-0.0*	-2.5***	-4.6**	-0.1	-1.8	-2
Type of financing in FC															
Bank	0.0	0.2	2.8*	0.0	0.0	1.0	0.0*	0.3	2.0	-0.1	-1.3	-1.1	0.0	1.8***	4.8***
Stock market	0.1***	-1.4	-2	0.1*	0.9	0.9	0.1	0.4	-0.4	0.1	2	2.5	0.1	1.7	2.0
Trade credit	0.0	-0.1	1.5	-0.0*	-0.1	-0.8	0.0	-0.5	-2.0	0.0	-2.2***	-11.2***	0.0	-3.3***	-8.7***
Others	0.0	0.4	0.9	0.0	-0.7	0.3	0.0	-1.0	-0.9	0.0*	1.0*	1.1	-0.1	-0.2	-1.9
Constant	0	-2.4	5.5	0	10.2	18.5	0	4.2	4.2	0.1	7.3	13.8	-0.4*	-9.3	-7.0
Observations	654	658	644	453	454	453	423	424	423	158	159	158	199	199	198
Companies	94	94	94	74	74	74	72	72	72	39	39	39	41	41	41

* p<.1; ** p<.05; *** p<.01
Source: BBVA Research with BMV data
The dependent variables are included as the difference against the immediately previous quarter
All regressions include fixed effects by economic sector and robust standard errors

As the models include interactions, the economic sector coefficients in Table 3.b.2 cannot be directly interpreted as marginal changes in the dependent variable to changes in the exchange rate. To obtain these changes, the resulting equations have to be evaluated at given values of the explanatory variable of interest, which in this case is the exchange rate. Table 3.b.3 reports the estimated changes in the dependent variables for each sample, by economic sector and in total, assuming a depreciation of 10% in the exchange rate and keeping all the other variables constant. Panel I shows the estimated changes in net borrowing in FC, Panel II the estimated RoA and Panel III the estimates for profit margin. Panel I shows that for all companies, a 10% depreciation in the exchange rate increases net borrowing against equity by 3.5 percentage points (pp). For companies that are net debtors, the effect increases two-fold, with an increase of 7.0pp. In the case of RoA (panel II), the effect of the exchange rate is positive for all companies, but if we only take into account the companies that

are net debtors in FC, the effect turns negative, and even more so for companies with weaker fundamentals (columns D and E). This could confirm that, so far, there is no evidence of exchange rate pass-through costs, so it is likely that firms might be sacrificing part of their profitability. The effect on the profit margin (panel III) is negative for all companies and it increases as the sample becomes smaller. Specifically, in those companies that have a significant percentage of liabilities in FC that mature in the short term and insufficient operating profits to cover them, the effect of a 10% depreciation could trigger a loss of up to 3.9pp in ROA and up to 6.7pp on the profit margin.

By economic sectors, Telecommunications companies seem to be the most sensitive to changes in the exchange rate, with respect to net borrowing and both profitability and margin. These effects increase in companies with weaker fundamentals. The Energy, non-basic Consumption and Materials sectors mostly show significant, negative effects on ROA and profit margin, which increase as the sample size falls towards companies with the most vulnerable flows.

Table 3.b.3
Estimated changes in borrowing and profitability (in percentage points) stemming from an additional 10% depreciation in the exchange rate

Economic sector	"A. Total companies"	"B. Net debtors in FC"	"C. Net debtors and maturities of 1 year > 10%"	"D. Revenue cover < 1"	"E. Profit cover < 1"
I. Net borrowing in FC against equity					
Energy	3.6	2.8*	3.2*	9.3*	3.3*
Materials	-1.4*	7.0	6.8	10.2	8.4
Industrial	6.2	11.1	7.3	7.2*	10.6
Non-basic Consumption	2.1	3.9	3.9	0.5*	4.3*
Frequent consumption	-2.0	-1.4*	-1.3*	4.2	-10.6
Health	5.5	13.3	13.8	3.4*	9.2*
Telecommunications	15.1	22.3	21.6	17.6	30.4
Total	**3.5**	**7.0**	**5.9**	**7.3**	**7.3**
II. ROA					
Energy	-5.3	-4.3	-4.8	-2.6*	-5.0
Materials	5.6	-2.6	-2.7	-1.2*	-3.6
Industrial	0.4*	-0.1*	-0.1*	2.2	0.1*
Non-basic Consumption	0.9	-3.3	-2.9	-4.3	-9.3
Frequent consumption	-0.8	-0.7*	-0.7*	-1.0	-3.1
Health	5.9	6.1	7.1	-2.5*	-4.1
Telecommunications	-5.2	-4.9	-4.2	-7.2	-8.1
Total	**0.8**	**-1.8**	**-1.8**	**-2.4**	**-3.9**
III. Profit margin					
Energy	-23.0	-20.2	-21.5	-16.3	-20.3
Materials	-6.7	-6.1	-6.2	-8.1	-7.3
Industrial	-3.1	-1.8*	0.1*	8.1	0.8*
Non-basic Consumption	-4.6	-6.1	-5.1	-9.1	-15.3
Frequent consumption	-0.6*	0.2*	-0.1*	0.0*	-1.5*
Health	-5.7*	10.8	13.8	-1.3*	3.7*
Telecommunications	-0.8*	-8.1	-5.9	-11.5	-15.4
Total	**-3.6**	**-3.7**	**-3.1**	**-3.8**	**-6.7**
Number of companies in the sample	**94**	**74**	**72**	**39**	**41**

*Not significant at 99% confidence level
Source: BBVA Research with BMV data

The above analysis uses the financial information reported by companies to identify those with fundamentals that could be more sensitive to changes in the exchange rate. But what about the information provided by share prices? Can they tell us anything about the market perception of the exchange rate exposure that firms face? Does the market perceive a generalised risk, or does it make a distinction between all companies and those with certain characteristics?

To answer these questions, we use a commonly-used method to measure the exchange rate exposure of companies and their determining factors, developed by Adler and Dumas (1984) and later supplemented by Jorion (1990).[3] Adler and Dumas (1984) define exchange rate exposure as the change in the market value of a company stemming from marginal changes in the exchange rate, which can be obtained from the coefficient of the following regression:

$$r_{i,t} = \alpha_i + \beta_{1i} r_{m,t} + \beta_{2i} TC_t + \varepsilon_{i,t} \qquad (1)$$

Where $r_{i,t}$ are the returns on the issuer's share *i*, $r_{m,t}$ the yields of an index representing the market and β_2 the coefficient that reflects the change in the returns that could be explained by movements in the exchange rate, after controlling for market yield. A positive coefficient in β_2 means that the exchange rate exposure of companies is positive; in other words, that increases (depreciations) in the exchange rate are associated with increases in the price of the shares. A negative exchange rate exposure means the opposite: depreciations in the exchange rate are associated with falls in share prices. Jorion (1990) proposes a second stage to this methodoloy so as to identify the factors that determine exchange rate exposure, estimating the following regression using OLS:

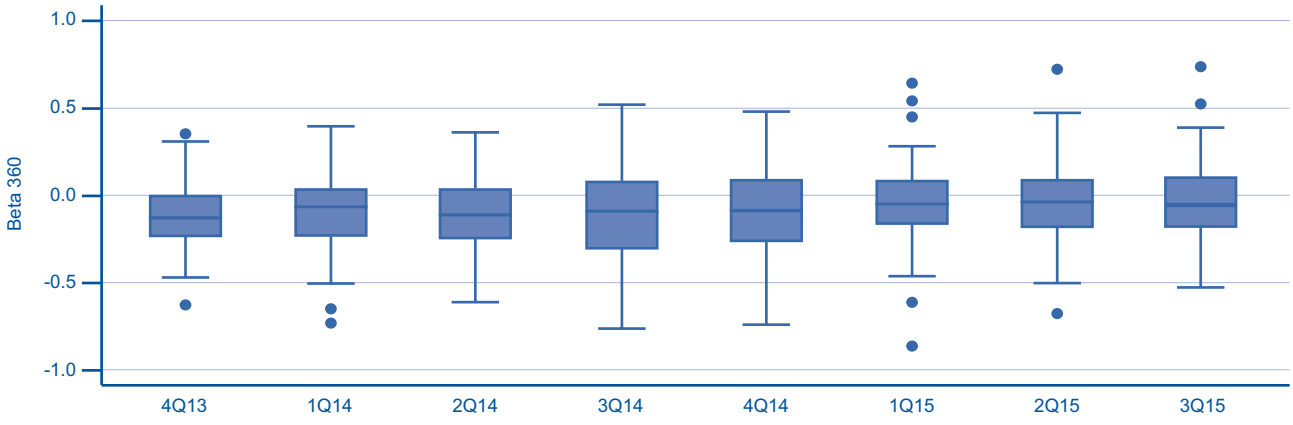
$$\hat{\beta}_{2i} = \mu_i + \theta_i X_i + \varphi_i \qquad (2)$$

Where $\hat{\beta}_{2i}$ is the estimated exposure in (1) and X_i is a set of characteristics of company *i*.

To estimate the exchange rate exposure of Mexican companies with this approach, we use information on the 55 non-financial companies that make up the Share Market Compound Index (IPC CompMx as it is known in Mexico), which are the largest and most liquid. Daily returns are used and one $\hat{\beta}_{2i}$ is estimated for each quarter with information on the previous 360 days, which will be the dependent variables of equation (2). Figure 3.b.22 presents a box plot with the distribution of the estimated betas of each quarter. The arms of each box illustrate the maximum and minimum values, whereas the top and bottom of the boxes indicate the 75 and 25 quartiles respectively. The line that divides each box is the mean and the dots outside of the arms are extreme values. A longer box indicates greater dispersion of the data. In all quarters, most of the data show a beta of less than zero, which indicates that the exchange rate exposure of a typical Mexican company is negative; i.e., a depreciation in the exchange rate is associated with reductions in share prices. The figure also shows that the beta of the median company has fallen over time, but the dispersion of the data has increased, especially in the latter quarters of 2014, coinciding with the start of the recent depreciation of the exchange rate. From 2015, there is a fall in the volatility of exchange rate exposure perceived by the market, although there are more extreme values, which could indicate that investors are rewarding or punishing certain companies for exchange rate movements, but not the whole market.

[3] Studies include Dominguez and Tesar (2004), Bartram and Bodnar (2007) and more recently Ito et al.(2015) and IMF(2015).

Figure 3.b.23
Distribution of exchange rate exposure perceived by the market



Source: BBVA Research with BMV data

Table 3.b.4 shows the results of different estimations of equation (2) only for companies that have negative exchange rate exposure. To facilitate the analysis, $\hat{\beta}_{2i}$ has been transformed into positive values, so that a negative (positive) coefficient means that marginal falls (increases) in an explanatory variable is negatively (positively) related to marginal movements in the exchange rate, keeping the other variables constant. Dummy variables for economic sector, use of derivatives, type of financing in FC and sales abroad have all been included as explanatory variables. Continuous variables included are: assets (in logarithms), RoA, percentage of liabilities in FC, net position in foreign currency as a percentage of equity, FC revenue over FC liabilities that mature in one year and annual percentage growth of GDP. All these variables have a one-quarter lag and those that are expressed as ratios are differentiated by one period, so that they indicate changes in percentage points.

Table 3.b.4
Factors determining exchange rate exposure measured with share price information

Explanatory variables	Dependent variable: Exchange rate exposure (beta) estimated with 360 day timeline									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Economic sector										
Energy	-0.064***	-0.086***	-0.096***	-0.112***	-0.102***	-0.088***	-0.085***	-0.091***	-0.100***	
Materials	0.090***	0.072***	0.069***	0.033	0.036	0.057**	0.057**	0.055**	0.049	
Industrial	0.007***	-0.009***	-0.013***	-0.012	-0.024	-0.025**	-0.025**	-0.018	-0.021	
Non-basic Consumption	0.036***	0.018***	0.012***	0.004	-0.01	-0.002	-0.002	-0.005	-0.012	
Frequent consumption	-0.009***	-0.025***	-0.033***	-0.047*	-0.052**	-0.024**	-0.025**	-0.024*	-0.033	
Telecommunications	0.001***	-0.019***	-0.017***	-0.067**	-0.071**	-0.054*	-0.053*	-0.051	-0.051*	
Log (Assets) $_{t-1}$		0.010**	0.007							
Dummy use of derivatives			0.017	0.034***	0.032***	0.029	0.03	0.033	0.035	0.027
Kind of financing in FC										
Bank				-0.058*	-0.033	-0.001	-0.001	-0.002	-0.002	0.006
Stock market				0.036**	0.046***	0.04	0.04	0.041	0.037	0.061*
Trade credit				-0.008	0.003	-0.039	-0.039	-0.029	-0.105	-0.105*
Others				0.059***	0.061***	0.077***	0.077***	0.080***	0.054***	0.064***
Dummy sales abroad					-0.074***	-0.084***	-0.084***	-0.085***	-0.068**	-0.059***
Δ ROA$_{t-1}$						-0.002**	-0.002**	-0.002***	-0.002**	-0.003***
Δ % of liabilities in FC $_{t-1}$							-0.001			
Δ Net position in foreign currency $_{t-1}$								-0.059		
Δ FC revenue cover $_{t-1}$									-0.012	-0.013*
Δ % GDP$_{t-1}$										-0.125***
Constant	0.186***	0.025	0.08	0.194***	0.230***	0.236***	0.236***	0.223***	0.312***	0.561***
N	281	239	239	281	281	201	201	197	187	187
R^2	0.06	0.06	0.06	0.13	0.16	0.15	0.15	0.16	0.15	0.15

* p<.1; ** p<.05; *** p<.01
Source: BBVA Research with BMV data
The standard errors are robust in all regressions.

Column (1) shows that the variables indicating economic sector are significantly different from zero, which indicates that the market seems to make a certain distinction in exchange rate exposure by economic sector. But, when we control for other variables, some of these coefficients lose significance and only the Energy and Telecommunications sectors remain relevant. For those sectors the market seems to percieve a lower exchange rate exposure than for the Health sector, which is the reference category. The dummy variable for use of derivatives is positive and significant when the dummies for type of financing (column 4) and sales abroad (5) are incorporated. This indicates that the market appears to perceive a greater exchange rate exposure for companies that use exchange rate derivatives, although this can be greater or lesser depending or the type of financing they are hedging and whether or not they sell abroad. Regarding the type of financing in FC, the category of "Other liabilities" is consistently positive and significant, implying that the market could be punishing companies with these liabilities more than other types of financing. As one would expect, the market allocates a lower exchange rate exposure to companies that have overseas sales. Changes in RoA and FC revenue cover also have the expected signs, so marginal increases in these variables will be associated with lower exchange rate exposure. Finally, the macroeconomic environment is also relevant to explain the exchange rate exposure perceived by the market and in the expected direction, as increases in GDP are associated with reductions in exposure.

3.b.6 Conclusions

This chapter presents data that allow us to identify the different types of financing in FC that Mexican companies have taken and their profile. Specifically, we can see that corporate borrowing in FC comes mainly from stock market debt issued abroad. As this debt has been issued mainly at fixed rates and with long-term maturities, it limits additional pressure on companies to meet their obligations. Data also show that there is a certain consistency between the degree of borrowing in FC and the concentration of sales abroad, as the companies that have borrowed the most are the large companies that belong to the Materials and Telecommunications sectors, which have the highest percentages of overseas sales.

The analysis of the relations between movements in the exchange rate and the fundamentals of companies does not appear to indicate any generalised deterioration in net FC borrowing or in the profitability of companies, although there does seem to be a greater impact on certain groups of companies. A particular risk of deterioration can be seen in companies with liabilities in FC that exceed the value of their assets, which have a significant percentage of their liabilities in FC that mature in the short term and which, assuming that they will have the same operating profits or revenues as they had in the 3Q15, they are not enough to cover the balance of the liabilities that mature in a one year horizon. By economic sector, the results suggest that the Energy, Materials, Telecommunications and non-basic Consumption sectors are the most sensitive to changes in the exchange rate. However, most of these sectors have a high percentage of their sales overseas, they could be able to refinance their debt without any great difficulty or make a greater effort to increase their revenues, reduce costs or even sell off some assets.

Share price information indicates that, in general, the market allocates a negative exchange rate exposure to Mexican companies. In other words, depreciations in the exchange rate are associated with reductions in share prices. Having overseas sales, higher RoA and greater FC revenue cover over short-term liabilities are factors associated with lower exchange rate exposure. Greater growth in GDP is also a relevant factor in the market's perception of this exposure. In terms of economic sector, sectors such as Energy and Telecommunications seem to be relevant for the market.

For the moment, the difficulties that some companies are having are not being passed on to the Mexican banking sector, as no increase can be seen in the NPL portfolio in FC. Even so, given the percentage of total corporate financing in FC, it is important to continue monitoring the fundamentals of Mexican companies to identify possible defaults that could lead to later deterioration. Furthermore, it is important that companies that take external financing should adequately identify and report the risks associated with these transactions.

Finally, this chapter presents a brief analysis of the possible substitution of debt in FC with debt in pesos. In line with Bank of Mexico's results from their most recent Report on the Financial System, the figures analysed in this chapter suggest that most companies are reducing their debt in FC and they seem to be replacing it with financing in pesos, mainly with loans from banks and suppliers. Although this could help these companies to reduce part of the exchange rate risk that they could possibly be facing at this time, it could also have repercussions for other companies, specifically for SMEs that finance their operations mainly in pesos. According to some recent studies, there is evidence suggesting that when large companies reduce their participation in stock markets and replace this debt with bank loans, the banks tend to shift loans to small and medium-sized enterprises. In the future, it will be important to monitor the behaviour of both kinds of credit.[4]

3.b.7 References

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[4] See for example Carabarin *et al*. (2015).

3.c A portrait of Mexican households: assets, liabilities and balance

The long-term financial strength of households is defined in terms of their financial wealth. In other words, the difference between the value of what they have (their assets) and what they owe (their liabilities). Assets provide a household[1] with the ability to flatten their consumption over time and acts as security to face contingencies. Households can decide to use part of their savings or sell some physical assets to prevent sudden falls in their consumption during difficult times. They can also decide to use some of these assets to settle their debts if their income does not allow them to cover the residue. As Carasso and McKernan (2007) point out, assets also serve as an investment, generating returns that increase household consumption over time, thus increasing the welfare of households in the long term.

Like assets, liabilities also provide families with the ability to soften their consumption over time. If a household cannot borrow against its future revenues, then it could be obliged to reduce consumption during times when the income falls. The constraints that prevent households from accessing credit in combination with the variations in their income can generate fluctuations in consumption that weaken the degree of household welfare (Chaudhuri & Paxson 2002). Borrowing not only acts as a cushion against emergencies, it also represents the means whereby households can accumulate assets. As we will see in detail in Section 3.c.2, for many households the home itself represents a very significant proportion of their assets, and many buy it with a mortgage. This way, households do not have to save up for years to buy their house with cash.

Although the acquisition of liabilities may represent opportunities for the household, excessive borrowing may mean a considerable burden for families and weaken their financial position in the medium or long term. This chapter analyses the financial position of households through a range of indicators that use information about assets, liabilities and household income. These are standardised indicators that are used throughout the world to measure the financial strength of households from micro-data. Analysing the financial wealth of households is important because it allows us to discover the amount of additional borrowing that they can take on without it becoming an exorbitant burden on their finances. This chapter supplements the study on household borrowing by the Banking Outlook journal of July 2014, which presented two detailed methodologies for measuring the financial burden of households.

Section 3.c.1 of this chapter describes in detail the database and the methodology used to estimate the assets, liabilities, income and expenditure of families. Section 3.c.2 presents a descriptive analysis of their assets and Section 3.c.3 presents the liabilities. Section 3.c.4 introduces the indicators of financial strength and Section 3.c.5 shows an international comparison of them. Finally, Section 3.c.6 presents the main findings and conclusions.

[1] Although a household may comprise more than one family, this study uses both terms indiscriminately for practical purposes.

3.c.1. Database and methodology

Our analysis here considers the data from the National Survey of Household Living Standards (ENNVIH, as it is known in Mexico). The ENNVIH is a panel survey that asks households about their assets, liabilities, income and expenditure, and also compiles the socio-demographic characteristics of the members of the household. It was designed by the Ibero-American University (UIA), the Centre for Research and Teaching in Economics (CIDE) and Duke University, USA.[2] The ENNVIH has been conducted on three occasions over a period of ten years: in 2002, 2006 and 2012,[3] and it is representative at a national, urban, rural and regional level. Unlike the National Household Income and Expenditure Survey (ENIGH) run by INEGI, the ENNVIH compiles information on the amount of assets and liabilities that households have, thus enabling us to estimate their financial wealth.[4]

The ENNVIH questionnaire asks the head of the household and his/her spouse (if applicable) about the value of the assets that the household possesses, including the assets that form part of the household business (if it has one). This question breaks down the kinds of assets one by one (house, car, electrical appliances, financial assets, etc.) and the interviewee records its value on the relevant line. The information is said to be self-reported because it does not come from government registers, but from the perception that the interviewee has of the value of the goods and real estate that he/she possesses.

Unfortunately, the ENNVIH questionnaire does not break down the kind of liabilities that the family has in the same detail. The question only asks about the total amount of the household debt, including interest. Although the information does not tell us the kind of debt that families have, it does provide a good idea of the burden that these liabilities represent for the family in comparison with the value of the assets that they possess and the monetary income they receive. As with the liabilities, the information is said to be self-reported because it does not come from government registers, but from the calculation that the interviewee makes of the amount of the household debts.

Apart from the assets and liabilities, the monetary income and expenditure is also calculated per household. The starting point to calculate these two variables is the INEGI methodology for estimating the monetary income and expenditure in the traditional construction of the ENIGH. This methodology adopts international conventions in these matters, specifically those issued in the International Conferences of Labour Statisticians and in the Canberra Group Report (INEGI 2014). According to INEGI, monetary income includes the income from the labour of the members of the household, the transfers that they receive (from public and private institutions and from other households) and the income they receive for the lease of their assets (be they physical or financial assets). These flows only take into consideration monetary inputs, thus excluding self-consumption and payments in kind that the family receives. Monetary expenditure, in turn, is the sum of the regular expenses that the households incur on goods and services for their consumption (food, transport, clothing, footwear, education, health, recreation, etc.). As with income, these flows only include monetary outflows.

Although we know the monetary income of a large proportion of the households that took part in the ENNVIH, there are many others that do not report on their revenues.[5] This is why the deciles of households are constructed from monetary expenditure, which we use as an income proxy for all households surveyed (unless otherwise indicated). Using monetary expenditure as a proxy for income is common practice in analysing micro-data from household surveys, and its use is widespread in studies mapping the socio-demographic characteristics of households according to their income level.[6] Unlike monetary income, monetary expenditure reflects how households manage to soften their consumption between periods, as the consumption of goods and services may be derived not only from the income of the members of the household, but also from loans

[2] Given its methodological stringency, the ENNVIH has been recognised by the World Bank with the Regional Prize for Statistical Innovation
[3] The third round of the ENNVIH started halfway through 2009 and was completed in 2012.
[4] For further details about the ENNVIH, visit http://www.ennvih-mxfls.org/.
[5] There is monetary income information for 82.3% of the sample of households; for monetary expenditure, the figure is 94.4%.
[6] See for example, Parker (2009), Cahuana, Sosa & Rubalcava (2013), Puspitasari, et al (2010), among others

that they have received or from part of their savings. Income, on the other hand, excludes flows that modify the net equity or net value of the household's assets or liabilities.[7]

Although monetary income does not define household deciles in our analysis, it is used in the construction of one of the indicators of family financial wealth, which is dealt with in detail in Section 3.c.5 of this chapter. Naturally, estimates that consider monetary income only take into account the households that report it, and the same is true of all the other figures mentioned here (e.g. the average value of houses and/or land that a household possesses is MXN607,343, calculated on the basis of the households that reported owning real estate).

Readers will realise that in Sections 3.c.2 and 3.c.3 our analysis focuses on the estimator of the average value of the variable in question. A preference for the average, rather than the median value, lies in the fact that, to date, there is no statistical study that allows us to make an accurate estimate of the standard error of the median for surveys with a complex statistical design.[8] The standard error of the average value of the different variables on the other hand, can be estimated by using one of several existing methodologies.[9] Standard error is an input of the coefficient of variation (CV), which is the standard indicator of the accuracy of the variables used in a survey;[10] the lower the CV, the greater the accuracy of the data in question (INEGI 2014). The average values reported here have a coefficient of variation equal to or less than 25%.[11] The median values are reported in the figures of Sections 2 and 3, just for reference, and consider the stratified design and the expansion factors of the sample; however, as we have already explained, they do not have the calculation of the CV. When calculating each average and median value, we only consider households that report the asset or liability in question.

Despite the disadvantage of the estimator of the median in terms of assessing its precision, Section 4 considers its value as it is the measure that is generally published by studies of the financial wealth of households in other countries. All the monetary figures mentioned in this study are expressed in real terms (baseline July 2015). The basis for calculating the percentage shares of each kind of asset only considers the families that own the asset in question.

3.c.2. Assets

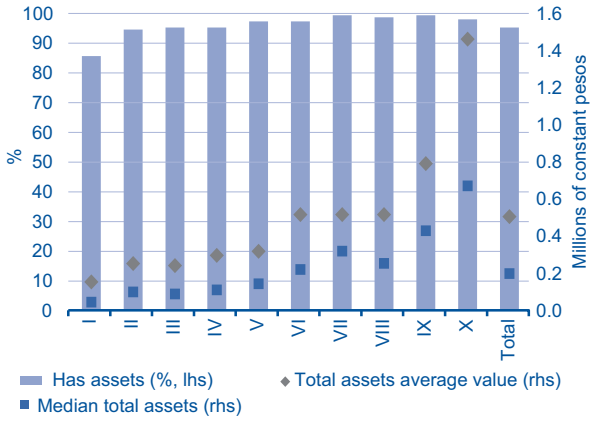
According to the ENNVIH 2012, a typical Mexican family has a house or land (81.1% of all households) with an average value of MXN607,343. Half of Mexican households do not own a means of transport (54.7%) and most of them have no savings and/or any other kind of financial assets (79.6%). The typical Mexican household owns electrical apparatus, household appliances, bicycles or furniture (95.9%) with an average value of MXN24,436. The house, household appliances and the furniture thus constitute the most common assets among Mexican families.

The average amount of total assets per household is MXN508,761, while the median value is MXN195,882, indicating a high concentration of assets in the higher-income households. Figure 3.c.1 shows the average and median value of total assets per household for each decile of monetary expenditure. On average, a household of the first decile has MXN160,959 in assets, one-ninth of what a household of the last decile has on average (MXN1,448,309).

[7] For greater detail about using expenditure as a proxy for income in household surveys, review "Measuring Living Standards: Household Consumption and Wealth Indices" (World Bank 2008)
[8] As with the ENNVIH and the ENIGH, which use a stratified sample design and expansion factors.
[9] Some of these include the linear estimate by Taylor series, bootstrap and Jackknife estimation, among others. This analysis uses linear estimation by Taylor series as it is the methodology recommended by INEGI for calculating the standard error of the ENIGH estimators.
[10] The CV measures the degree of dispersion of the estimator in question. If we define the estimator as θ, the CV is given by: EE(θ) / θ, where EE(.) denotes standard error.
[11] According to the intervals established by the INEGI, a CV of 15.0% or less has a good degree of accuracy; between 15.0% and 25.0%, the degree of accuracy is acceptable. For further details, review the tables of statistical accuracy in the INEGI surveys, available at www.inegi.org.mx.

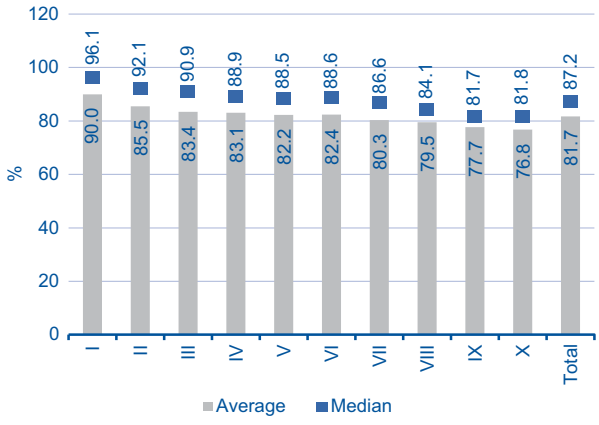
Houses and land owned outright represent on average 81.7% of the total assets of the households that own them. These same goods account for 90.0% of the total assets of a household in the first decile on average, and 76.8% of the total assets of a household of the last decile. This suggests that the lower-income households have less-diversified assets, with almost all their wealth concentrated in their houses and land (Figure 3.c.2).

Figure 3.c.1
Total assets: ownership and value by decile. Average and median



Source: BBVA Research with ENNVIH 2012 data

Figure 3.c.2
Real estate assets: percentage share of total assets. Average and median per household

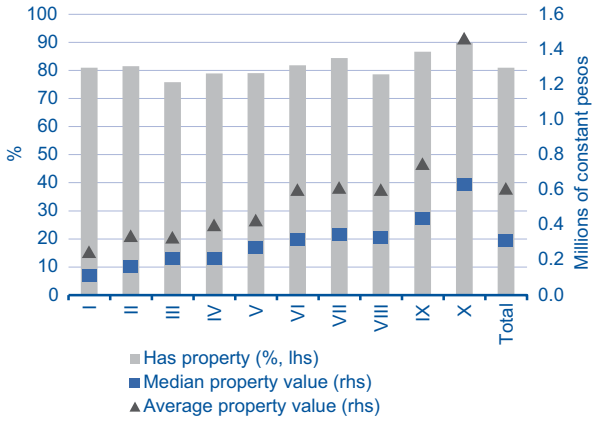


Source: BBVA Research with ENNVIH 2012 data

Although eight out of ten households of the first decile have their own house or land, its average value only amounts to MXN246,830, one-sixth of the average value of the properties of the last decile (MXN1,462,657). Nine out of ten households of the last decile have their own real estate (Figure 3.c.3).

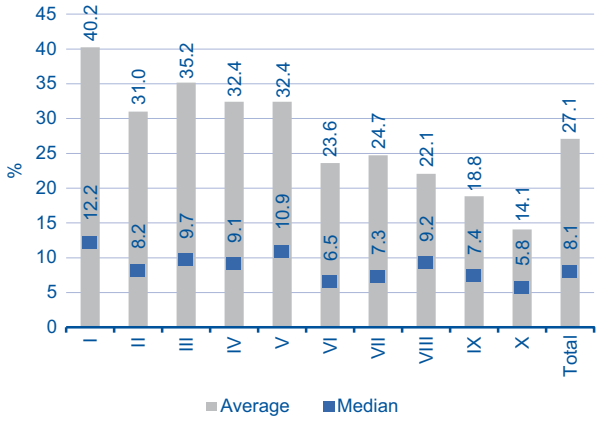
Electrical apparatus and household appliances on average represent 27.1% of the total assets of the household that owns them. These same goods account for 40.2% of total assets of a household of the first decile on average, and 14.1% of the total assets of a household of the last decile (Figure 3.c.4). Although eight out of every ten households of the first decile have electrical apparatus and household appliances, on average their value amounts to MXN8,514, one-seventh of what a household of the last decile owns on average (MXN57,072) (Figure 3.c.5).

Figure 3.c.3
Real estate: ownership and value by decile. Average and median



Source: BBVA Research with ENNVIH 2012 data

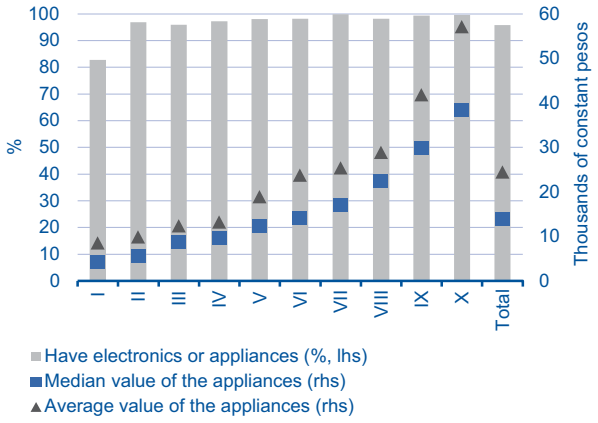
Figure 3.c.4
Electrical apparatus and household appliances: percentage share of total assets. Average and median per household



Source: BBVA Research with ENNVIH 2012 data

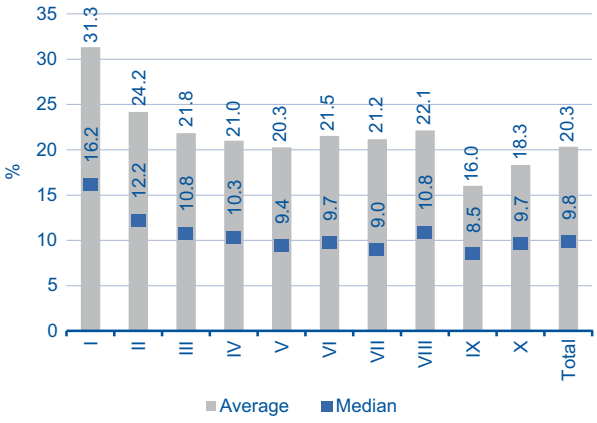
Means of transport account for an average of 20.3% of total household assets. For a household of the first decile, means of transport account for 31.3% of their total assets on average, and for a household of the last decile they account for an average of 18.3% (Figure 3.c.6). Only 9.3% of households of the first decile have means of transport, whereas 86.7% of the households of the last decile have their own transport. The average value of people's own form of transport in a household of the first decile is MXN25,938, one-fifth of the average value of the means of transport of a household in the last decile (MXN139,632) (Figure 3.c.7).

Figure 3.c.5
Electronic apparatus and household appliances: Ownership and value by decile. Average and median



Source: BBVA Research with ENNVIH 2012 data

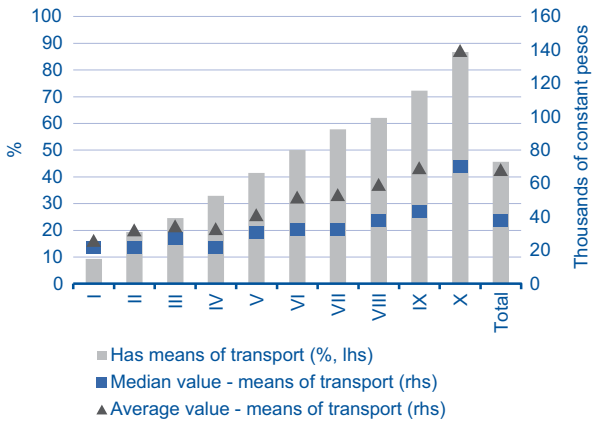
Figure 3.c.6
Transport: percentage share of total assets. Average and median per household



Source: BBVA Research with ENNVIH 2012 data

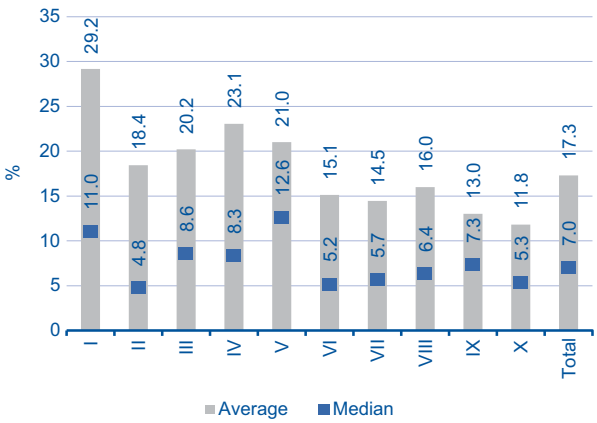
On average, financial assets represent 17.3% of total assets if we take into consideration all the households that have them (Figure 3.c.8). For a household of the first decile the proportion rises to 29.2%, and for a household of the last decile the figure is 11.8%. In the first decile, only 5.1% of households report having this kind of asset, whereas in the last decile the proportion is 45.2%. The above suggests that higher-income households make more use of this channel to accumulate wealth. On average, the value of financial assets in the first decile is MXN16,268, whereas in decile X the average value is MXN110,083 (Figure 3.c.9).

Figure 3.c.7
Transport: ownership and value by decile. Average and median



Source: BBVA Research with ENNVIH 2012 data

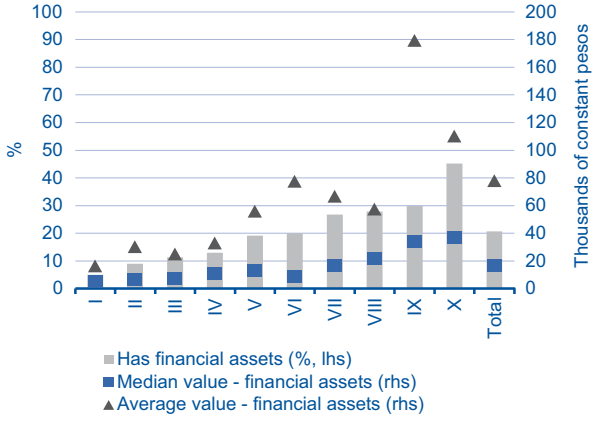
Figure 3.c.8
Financial assets: percentage share of total assets. Average and median per household



Source: BBVA Research with ENNVIH 2012 data

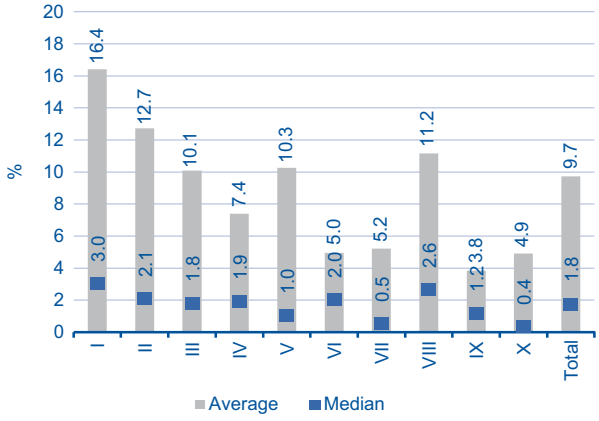
ENNVIH figures indicate that a significant number of households keep part of their wealth in animals (cattle, sheep, pigs, poultry, etc.). On average, this kind of asset represents 9.7% of the household's total assets, although the figure varies depending on the decile in question. In decile I the average is 16.4%, while in decile X the average is 4.9% (Figure 3.c.10). In the first decile 25.2% of households report assets of this kind, whereas in decile X the figure is 10.3%. The average value of the animals owned by households of decile I is MXN5,868, whereas for households with the highest income (decile X) it is MXN64,010 (Figure 3.c.11).

Figure 3.c.9
Financial assets: ownership and value by decile. Average and median



Source: BBVA Research with ENNVIH 2012 data

Figure 3.c.10
Animals: percentage share in total assets by decile. Average and median

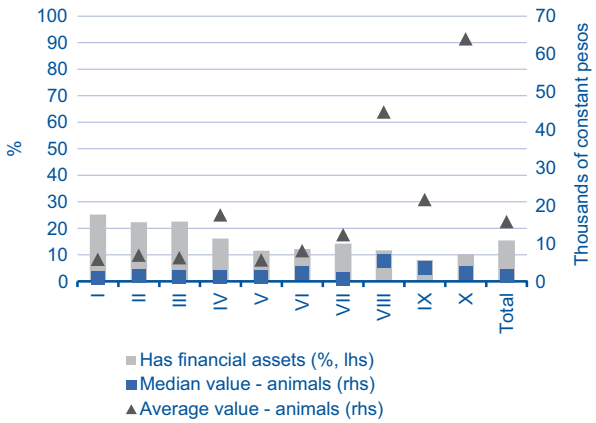


Source: BBVA Research with ENNVIH 2012 data

3.c.3. Liabilities

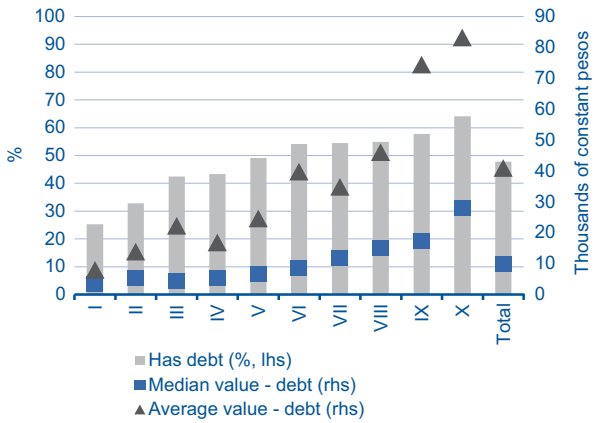
According to ENNVIH 2009-12 data, half of Mexican families have some kind of debt (47.8%), with an average value of MXN 40,952. Among the poorest households, there are fewer families that report some kind of borrowing, in comparison with the highest income households: only 25.3% of the households of the first decile report debts, compared with 64.1% of the households of decile X. On average, the value of the debt of a household of decile X is MXN83,125, over ten times the average debt of households of decile I (MXN7,974) (Figure 3.c.12).

Figure 3.c.11
Animals: ownership and value by decile. Average and median



Source: BBVA Research with ENNVIH 2012 data

Figure 3.c.12
Total liabilities: ownership and value by decile. Average and median



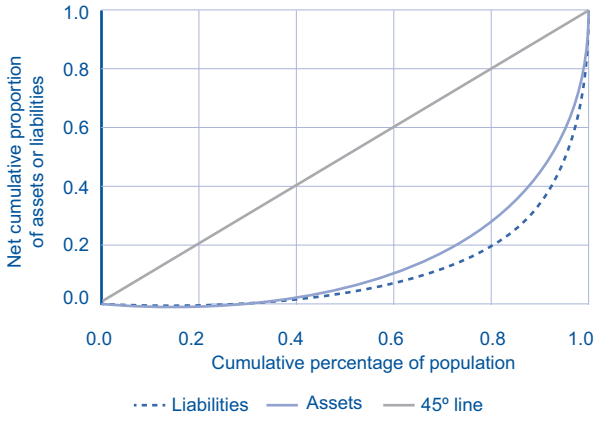
Source: BBVA Research with ENNVIH 2012 data

As shown in Figures 3.c.1 and 3.c.12, total assets and liabilities are not distributed equally among all households. The families with the highest income accumulate a larger proportion of both the total assets and the liabilities of all Mexican families. Figure 3.c.13 shows the Lorenz curve of total household assets and liabilities. This curve organises all households along the horizontal axis, from those with the least assets to those with the most, and shows the accumulated percentage of total assets on the vertical axis. If asset distribution were equitable among all families, the Lorenz curve would be linear, running at 45 degrees. The less equitable the distribution of assets, the further away the Lorenz curve is from the 45º straight line. Alongside the Lorenz curve of total assets and total liabilities, Figure 3.c.13 shows the 45º straight line as a comparison. As we can see, although the distribution of total assets is more equitable than the distribution of liabilities, the distribution of both variables is far from equitable.

Along with the Lorenz curve, the Gini coefficient is a measure of the degree of inequality in the distribution of a variable. It equals the area between the 45º line and the Lorenz curve, divided by the triangular area under the 45º line. If the Gini coefficient is zero, there is no area between the 45º line and the Lorenz curve: both lines are the same and the distribution of the variable is perfectly equitable. If the Gini coefficient equals one, the numerator is equal to the denominator and the Lorenz curve is as far away as possible from the 45º line, representing perfect equality (Arnold 2014). Hence, the larger the Gini coefficient, the greater the inequality in the distribution of the variable in question. A calculation of the Gini coefficient of total household assets with ENNVIH data gives an estimate of 0.71, and 0.76 for total liabilities.

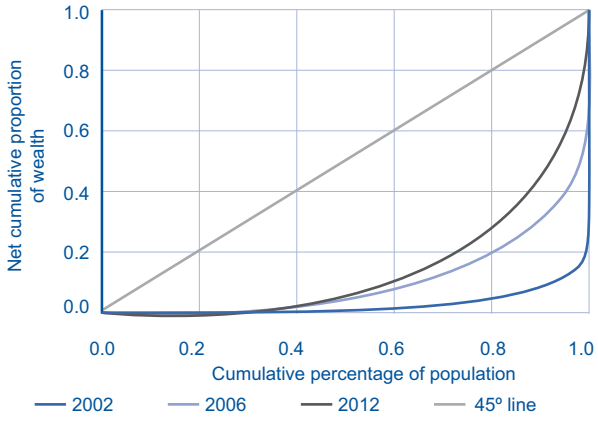
Although the distribution of total assets and liabilities among Mexican households remains far from equitable, the ENNVIH data suggest that it has improved over time. According to ENNVIH, the distribution of the net wealth (total assets minus total liabilities) is now more equitable. Figure 3.c.14 shows the Lorenz curve of the net wealth of Mexican families for the three waves of the survey. Since 2002, the curve has come closer to the 45º straight line. That year, the Gini coefficient reached 0.92. In 2006 it fell to 0.77, and in 2012 to 0.68. These results suggest that the financial strength of the lowest-income households has improved, at least since the ENNVIH was conducted for the first time. The next chapter analyses some of the key indicators of the financial position of Mexican families in detail, and the penultimate section compares these indicators with estimates for other countries.

Figure 3.c.13
Lorenz Curve: Total Assets and Total Liabilities (2012)



Source: BBVA Research with ENNVIH 2012 data

Figure 3.c.14
Lorenz Curve: Net Wealth (2002, 2006 and 2012)

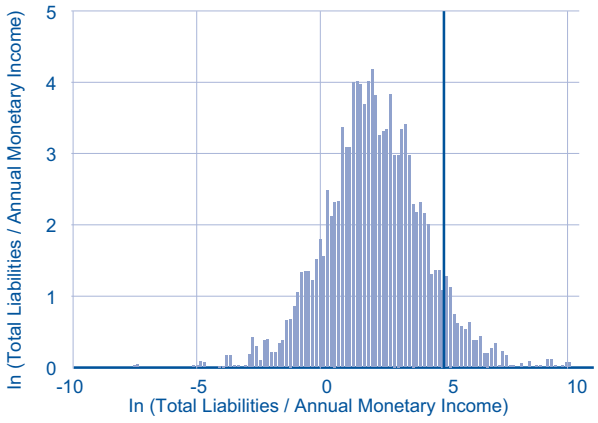


Source: BBVA Research with ENNVIH 2002, 2006 and 2012 data

3.c.4. The financial position of Mexican families: the net balance

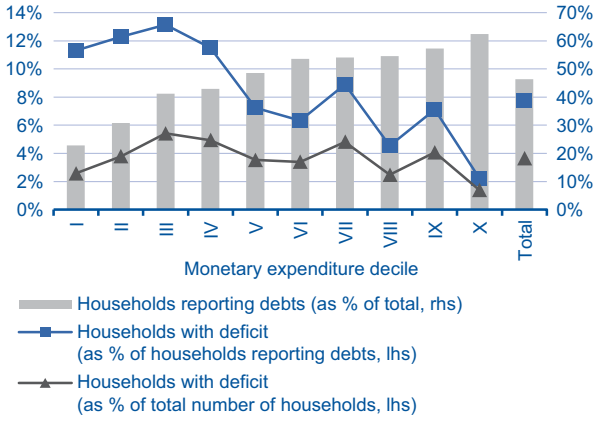
According to ENNVIH 2012 data, on average, household liabilities represent 67.1% of their assets, and 5.8% in the median household. The Total Liabilities/Total Assets ratio (TL/TA) is one of the indicators typically used to measure the financial strength of families in the long term, as it expresses household debt in terms of total amount of resources that the family has to meet these obligations (European Central Bank 2013). The data for Mexico indicate that, despite the fact that most households are in a comfortable position (with liabilities that represent one-seventeenth of their assets or less), there are households that show a weak financial position, with a total debt that exceeds the total value of their wealth by a large margin. That is why the average value exceeds the median value of the TL/TA by far. Figure 3.c.15 shows the histogram of the natural logarithm of the Total Liabilities/Total Assets ratio. We use the logarithmic transformation of the TL/TA ratio because it more clearly illustrates the distribution.[12] The blue line indicates the area encompassing households with a TL/TA ratio of 1. In other words, their total liabilities are equivalent to their total assets. To the left of this line are the households with a TL/AT ratio <1 and on the right are those with a TL/AT ratio >1. As we can see, although the vast majority of households are in surplus (92.1%), a fraction of them report a deficit in their wealth (7.9%). Among the households with a negative balance, 4.4% record a deficit of twice the amount of their total assets or more. Of the households with a positive balance, 86.1% report a total debt equivalent to half of their assets or less.

Figure 3.c.15
Distribution of the natural logarithm of the Total Liabilities/Total Assets ratio



Source: BBVA Research with ENNVIH 2012 data

Figure 3.c.16
Households reporting debt (as % of total) and households with a deficit (as % of households reporting debt). By expenditure decile



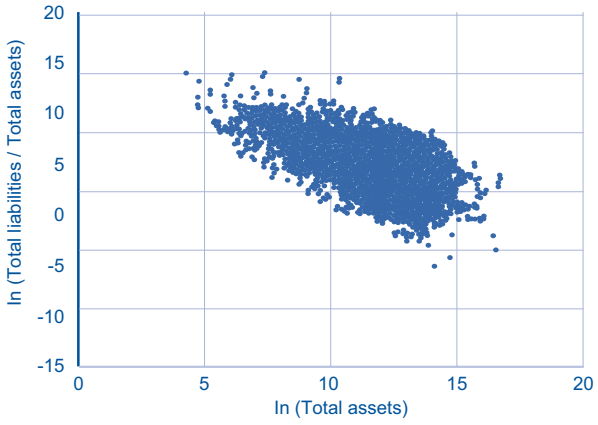
Source: BBVA Research with ENNVIH 2012 data

A finer analysis of households with a deficit indicates that the proportion of these is higher in the lower-income deciles compared with the higher-income households. Taking the total number of households reporting debts as the baseline: in decile I, 11.3% of households with some kind of debt have a deficit; in decile II, the figure is 12.3%, and for decile III it is 13.1%.[12a] In the higher deciles, in turn, the figures fall to 4.5% (decile VIII), 7.1% (decile IX) and 2.2% (decile X). Figure 3.c.16 shows the number of households with a deficit by decile, as a percentage of the households that report debts. It also shows the number of households with a deficit by decile, as a percentage of the total number of households, and as a reference, it presents the proportion of households in each decile that report some kind of debt.

[12] As the Total Assets/Total Liabilities ratio takes very low and very high values for some households (biased distribution), the logarithmic transformation is used to represent its distribution better. For greater detail on the logarithmic transformation of variables, review Warner (2008) and Charpentier & Flachaire (2014).
[12a] It is important to remember that the baseline for calculating these percentages is the number of households that report debt in each decile. As Figures 12 and 16 show, the proportion of households that report debts is lower among lower income households than for the better-off households

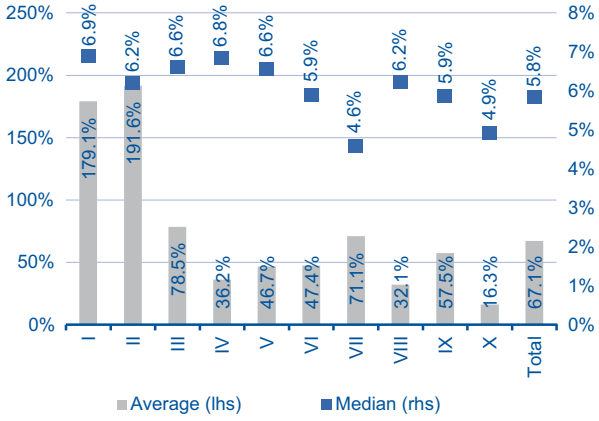
According to ENNVIH 2012, households with larger assets borrow less in comparison with their wealth. Figure 3.c.17 shows the association between the amount of total assets and the TL/TA ratio (in logarithms). As we can see, the value of the TL/TA ratio diminishes as households with assets of higher value come into the equation. The correlation coefficient between the two variables is -61.2%. The median TL/TA ratio in decile I is 6.9% and the average is 179.1%. In decile X, the figures are 16.3% and 4.9% respectively (Figure 3.c.18). The fall in the TL/TA coefficient in response to increases in total assets suggests that increases in the amount of household assets[13] are accompanied by less than proportional increases in the amount of their borrowing,[14] suggesting low sensitivity of the balance of the debt to changes in the value of the assets.[15]

Figure 3.c.17
Total Assets vs. Total Liabilities/Total Assets (natural logarithm)



Source: BBVA Research with ENNVIH 2012 data

Figure 3.c.18
Total Liabilities/Total Assets Ratio. By expenditure decile. Average and median



Source: BBVA Research with ENNVIH 2012 data

If the total amount of household debt had to be paid at once, 9.8% of the balance would be left unsettled, because households would not have sufficient assets to cover it. In other words, the sum of the deficit of all households reporting a debt represents one-tenth of the total balance of the debt.

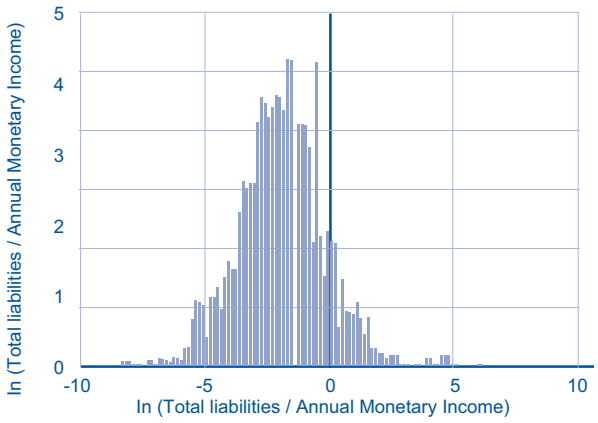
Although the ENNVIH is not an annual survey, it does give us an idea of how the TL/TA indicator behaves over time. From 2002 to 2012, the median TL/TA ratio grew by 1.3 percentage points (pp), from 4.5% to 5.8%. In this same time interval, median total liabilities grew by 48.9% in real terms, while median total assets grew 36.4%.[16] This would suggest that Mexican families have increased the balance of their borrowing in comparison with their assets since the ENNVIH was conducted for the first time.

As well as comparing the total amount of household liabilities with the total value of their assets, we also compare the value of their liabilities with their annual monetary income. This measure shows the number of years that it would take the household to pay off all its debts, if it used all its monetary income for this purpose each year. Unlike the TL/TA ratio, the Total Liabilities/Annual Monetary Income ratio (TL/AMI) provides information about the degree to which the household debt can be settled using its income flow, instead of its assets. This reflects the family's capacity to get out of debt in the medium term (European Central Bank 2013). According

[13] Denominator of the TL/TA ratio
[14] Numerator of the TL/TA ratio
[15] The Ordinary Least Squares (OLS) estimate of the sensitivity of the balance of debt to changes in the amount of assets gives an elasticity of 0.33
[16] This calculation only includes the households that report information on total assets and liabilities, to be able to calculate the TL/TA ratio. The growth rate of the median value of total assets and liabilities is reported respectively. We preferred to calculate the median over the average in order to guarantee the comparison with other countries (Section 5 presents the international comparison of the TL/TA indicator).

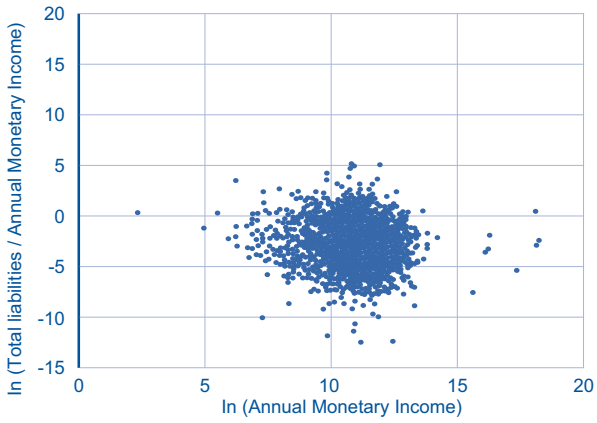
to the ENNVIH 2012 data, the total debt of the median household represents 13.4% of its monetary income, and 86.6% of the average household. The results indicate that although most households could pay down their debt with one and a half months of their annual income or less,[16a] there are households that would require ten months to settle their total liabilities.[16b] That is why the average value exceeds the median value of TL/AMI by a long way. Figure 3.c.19 shows the histogram of the natural logarithm of the TL/AMI ratio. The blue line indicates the area encompassing households with a TL/AMI ratio equal to 1. In other words, their total liabilities are equivalent to their annual monetary income. Households with a TL/AMI <1 are to the left of the line and those with a TL/AMI >1 are to the right. As we can see, although most households could settle their debt with one year's monetary income or less (88.1%), a proportion of them would require more than one year to pay off their debt (11.9%).

Figure 3.c.19
Distribution of the natural logarithm of the Total Liabilities/Annual Monetary Income ratio



Source: BBVA Research with ENNVIH 2012 data

Figure 3.c.20
Monetary Income vs. Total Liabilities/Monetary Income (natural logarithm)



Source: BBVA Research with ENNVIH 2012 data

The TL/AMI coefficient does not appear to be as closely associated with the level of household income as the TL/TA ratio is with the level of assets. Figure 3.c.20 illustrates the TL/AMI levels reported by households in accordance with their annual monetary income (both variables in logarithms). As we can see, the association is relatively weak, with a correlation coefficient of 32.5%. The lack of sensitivity of the TL/AMI coefficient to increases in annual monetary income suggests that increases in household income[17] are accompanied by almost proportionate increases in the amount of their borrowing,[18] pointing to a greater sensitivity of the balance of the debt to changes in the income level, in comparison with the variation of this variable to changes in level of assets.

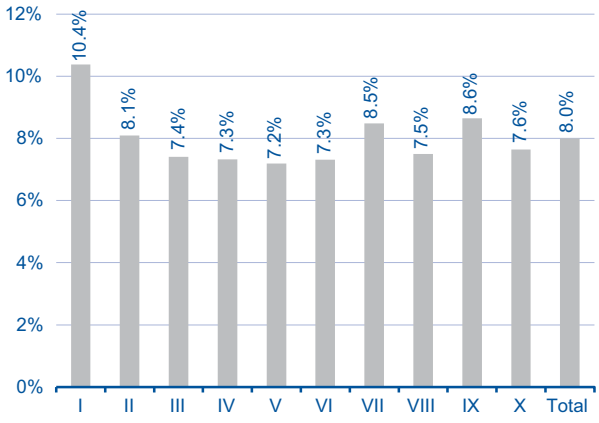
Estimating the financial burden of Mexican families from the ENIGH indicates that the amount of debt that households pay off (depreciations, interest and fees) increases with their income level such that the Debt Payment/Income ratio does not vary significantly among the different deciles (except for the first decile, for which the median of the amount of debt paid off as a proportion of monetary Income is just over 10.0%).[19] In 2014, the median value of the financial burden of deciles II to X fluctuated between 7.2% (decile V) and 8.6% (decile IX).

[16a] If the annual income of the household were distributed equally over twelve months
[16b] Idem.
[17] Denominator of the TL/AMI ratio
[18] Numerator of the TL/AMI ratio
[19] For further information about estimating household financial burden from the ENIGH review Banking Outlook of the first semester of 2014.

Figure 3.c.21 shows the median value of the financial burden for all deciles and for all households in Mexico. Figure 3.c.22 presents the median value of this indicator taking into account all Mexican households, for each time the ENIGH has been conducted since 2000.

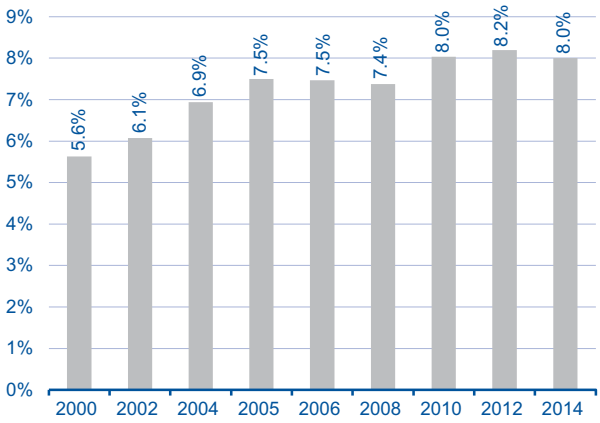
According to the ENNVIH data of 2002-12, the TL/AMI indicator showed a 4.6pp increase, from 8.8% to 13.4%. Annual monetary income of households fell by 3.9% in real terms over the same period, while the amount of total liabilities increased by 57.1%.[20] Although Mexican households have increased the balance of their debt by a magnitude that is more than proportional to the increase recorded in their income, the median of the TL/AMI indicator suggests that liabilities have not become a stress factor for the finances of an overwhelming majority of families. This result suggests that the starting point for borrowing levels is very low for many households, considering both formal and informal financial intermediaries. As we describe in detail in the next section, the TL/TA and TL/AMI indicators in Mexico are still way below the levels seen in other emerging and developed countries.

Figure 3.c.21
Financial burden 2014. Median value. Baseline monetary income



Source: BBVA Research with ENIGH 2014 data

Figure 3.c.22
Household financial burden. Median value. Baseline monetary income



Source: BBVA Research with ENIGH 2000, 2002, 2004, 2005, 2006, 2008, 2010, 2012 and 2014 data

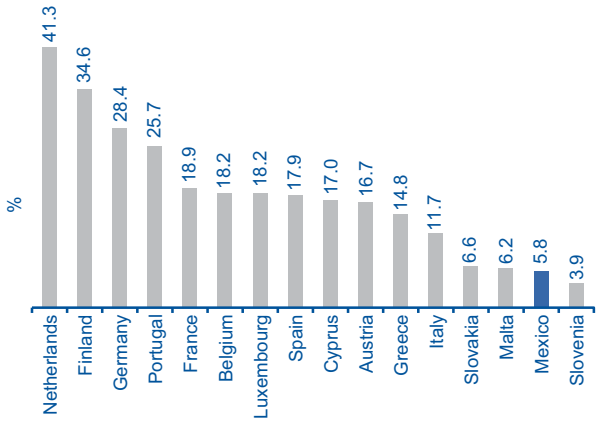
3.c.5. International comparison

As mentioned in the Banking Outlook journal for the first half of 2014, there are several countries that conduct household surveys to obtain information about living standards. The European Central Bank is responsible for the Eurosystem's Household Finance and Consumption Survey (HFCS) that compiles information on the countries of the eurozone. According to HFCS data, the median value of household liabilities as a proportion of their income in Mexico is similar to levels observed in Slovakia and Slovakia (among the countries covered by the HFCS). This ratio exceeds 100% in Holland, Cyprus, Portugal and Spain, and it is lower than 30% for Slovenia, Slovakia and Mexico. Figure 3.c.24 shows the median Total Liabilities/Income ratio for fifteen countries of the European Union (EU) covered by the HFCS (2013) and Mexico (ENNVIH 2012).

[20] This calculation only includes households that have information about total liabilities and annual monetary income, for which a TL/AMI ratio can be calculated. The growth rate of the median value of total liabilities and annual monetary income are reported respectively.

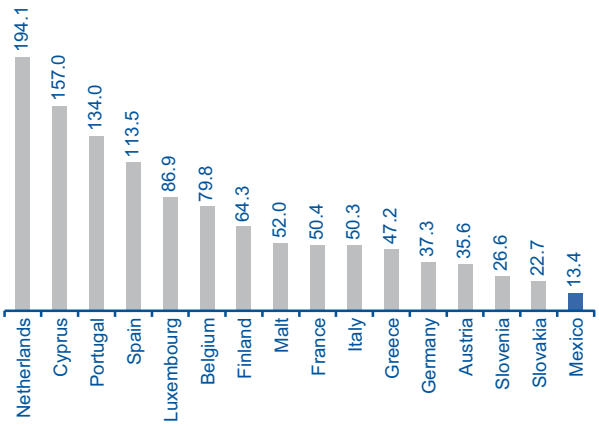
In terms of the Total Liabilities/Total Assets ratio, Mexico is below the figure observed in most of the HFCS countries. Slovenia, for example, reports a coefficient of 3.9% and Slovakia 6.6%, while the figure for Mexico is 3.9%. Figure 3.c.23 shows the median Total Liabilities/Total Assets indicator for HFCS (2013) countries and Mexico (ENNVIH 2012).

Figure 3.c.23
Total Liabilities / Total Assets
Percent. Median*



* The figures for the European Union countries are for 2013, and for Mexico for the last time the ENNVIH was conducted (2012)
Source: BBVA Research with HFCS data (for the European Union) and ENNVIH (for Mexico)

Figure 3.c.24
Total Liabilities / Income
Percent. Median*



* The figures for the European Union countries are for 2013, and for Mexico for the last time the ENNVIH was conducted (2009-12)
Source: BBVA Research with HFCS data (for the European Union) and ENNVIH (for Mexico)

3.c.6. Conclusions

An analysis of household assets, liabilities and the net balance provides us with information on the current state of family finances and their leverage capacity in the future. The net balance between what a household possesses and what it owes must guarantee that its consumption is stable over time. Excessive borrowing can trigger harmful consequences for a family and for the economy as a whole when the number of families with a deficit is significant, and the volume of this deficit reaches a significant percentage of the total portfolio.

According to ENNVIH data, the house, household appliances and furniture constitute the most common assets of Mexican households. Houses and land concentrate four-fifths of the value of the assets of the household that owns them (on average), and for lower-income households this proportion exceeds 90%, thus reflecting a less-diversified portfolio.

As for liabilities, ENNVIH data indicate that half of Mexican families have some kind of debt. The data suggest that there are fewer households that report some kind of borrowing among the lower-income deciles in comparison with the better-off households. Although higher-income families accumulate a larger proportion of assets and debts, the distribution of both variables has become more equitable since the ENNVIH was first conducted, pointing to a greater share of low-income households in the lending market.

The financial wealth indicators reveal that most Mexican households have healthy finances; they are in a comfortable position with liabilities representing one tenth of their assets or less. However, 7.9% of families show a deficit in their wealth, 4.4% of whom have debts equivalent to two times the total amount of their assets or more. Although the proportion of households under financial stress is not high, it does represent a focus of attention in terms of the social effects that the bankruptcy of these families could have, especially if we consider that the percentage of households with a deficit is greater among the low-income deciles.

An analysis of the TL/TA and TL/AMI ratios indicates that the balance of Mexican household debt is more sensitive to the amount of revenues than to the value of household assets. Households with more assets borrow less in comparison with their wealth, while the amount of the liabilities seems to respond more to a variation in income. Although most households could settle their debt with one year's monetary income or less, 11.9% would require more than one year to pay off their debt.

Our findings suggest that most Mexican households present a healthy net financial balance and they are capable of surviving periods of financial stress. The financial position indicators show that families that already have a loan maintain the capacity to acquire financing that allows them to accumulate assets or face emergency situations. On the other hand, there is a significant proportion of households that have no kind of loan. For these families, the lack of liabilities eliminates one source of pressure on their resources but, at the same time, is a disadvantage if these households have experienced difficulties in acquiring them, or if its members do not have a loan. As mentioned in the Banking Outlook journal of January 2015, the informal economy limits the supply of and demand for loans, and is a disincentive to using other banking services. More households will be able to face external shocks and soften their consumption over time, as their members get the legal support they are entitled to by the activities they are engaged in.[21]

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[21] According to the National Occupation and Employment Survey (ENOE, as it is known in Mexico) in 3Q2015 57.8% of the working population worked in the underground economy.

3.d. An Optimal Collection Strategy for Credit Card Management

3.d.1 Introduction

By the end of 2015, the commercial banking business in Mexico reported approximately 18.5 million active credit cards with an estimated balance close to 332 thousand million pesos from which a significant portion was not repaid by its due date. Hence, having an optimal collection strategy for these delinquent accounts is essential.

The main goal of this study is to propose a technique to find an optimal collection strategy that maximizes the number of recovered credit cards using as few resources as possible and considering the natural constraints that result from limited resources. A card is said to be *recovered* if its holder pays at least the minimum required to return to a non-delinquent stage.

Collection actions will generally depend on the time the account has been in delinquency. Usually delinquency stages are defined from 30 past due onwards, and because the stage we will study in this paper is from 21 to 30 days past due, we will refer to it as *Pre-Delinquency Stage* (PDS). The reason to analyse this stage is that some banks give a grace period of 20 days, so this PDS is the period between the end of the grace period and the next billing date. Figure 1 illustrates these concepts.

Diagram 3.d.1
PDS Stage

Source: BBVA Bancomer

Another particularity of credit cards is that not all of them have the same billing date, which means that the billing date in Figure 1 might be referenced to any day between the 1st and the 28th day of the month. This fact might have an impact on the daily collection strategy because the number of credit cards is different for each billing date.

A commonly used collection strategy ranks the credit cards in levels of risk of delinquency that are used to establish the order in which the accounts will be collected. Even when there are several collection methods to persuade the customer to pay, the most used are phone calls.

There has been few work done for modelling this problem. In credit risk it is typical to model events but not decisions, for instance, probability of default but not probability of default given any action. This kind of modelling is known as Credit Scoring and there is plenty of literature: Siddiqi (2012), Anderson (2007), Thomas et. al. (2002). There are vendors that are specialized in this matter but few of them offer decision modelling solutions. There is some work done in this matter regarding credit line assignments: Trench et al. (2003), So and Thomas (2011). Specifically, there are some articles related to decision modelling applied for collection strategies. Makuch et. al (1992) did an analysis using linear programming (similar as the one we propose here) but suggest that there has to be a period of data collection with a “champion- challenger” mechanism which may result in very high costs. Filho et. al (2010) propose an approach which uses Dynamic Programming (that we also use in this approach) but they do not address the problem of capacity restrictions nor the existence of different billing dates. However it does consider which collection actions should be undertaken and how long they should be performed.In this work, collection actions are phone calls and the decision of calling or not ca-

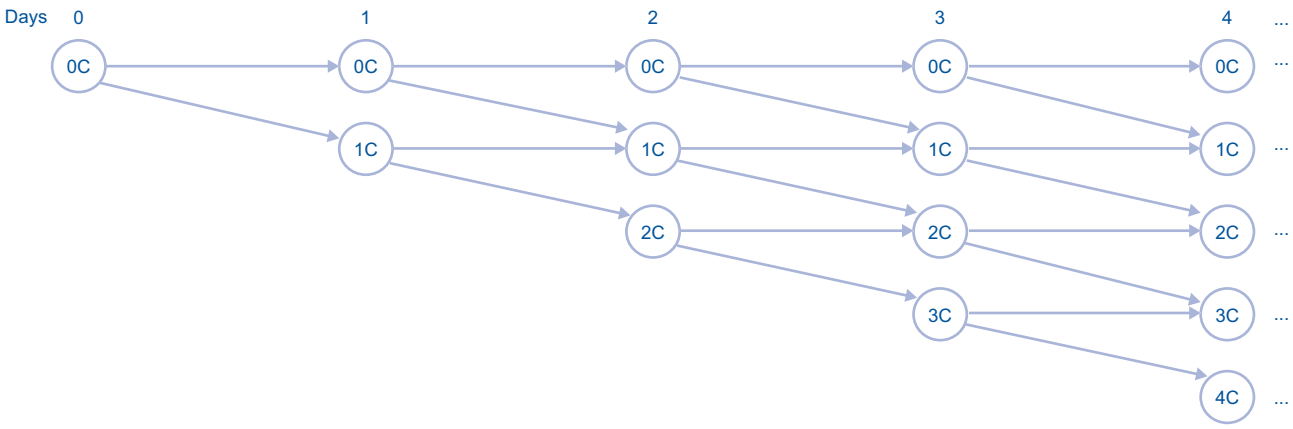
lling each risk-level group will be made on a daily basis so that the expected recovery rate is maximized and constraints of capacity are satisfied. These choices will be obtained via the solution of a binary linear program and the dynamic programming approach.

The format of the remainder of the paper is as follows. Section 3.d.2 contains definitions, theoretical concepts and the full description of the methodology. Section 3.d.3 will present the main results of the study. Section 3.d.4 will discuss further work that could be pursued. Finally, Section 3.d.5 will bring some conclusions in terms of the strengths and weaknesses of the proposed technique.

3.d.2 Methodology

As said before, the main goal of this article is to find an optimal collection strategy, in the sense of maximizing the recovery rate subject to the limited resources of phone calls that can be made with the hired calling agents. It has also been said previously that there is one collection stage that this study will focus on PDS which lasts 10 days. For simplicity we will assume that at most, a cardholder can only be called once a day. Given this last assumption, the problem can be seen as a daily decision problem of whether or not to call each cardholder. The next definition allows us to graphically describe the problem. A path p is a sequence of binary decisions between calling or not calling each cardholder. Diagram 3.d.2 illustrates all the possible paths of the first 4 days.

Diagram 3.d.2
Possible paths in first four days of PDS



Source: BBVA Bancomer

Each of these binary decisions has an associated recovery rate and so does each path. Each binary decision depends on three things:

- time *t* at which the decision is made
- number of calls made until that time: g_t
- the result of the decision of calling or not calling: g_{t+1}

Given these definitions, we can now define the recovery rate $r^t_{gt\ gt+1}$ associated to each binary decision:

$$r^t_{g_t g_{t+1}} = R^t_{g_t g_{t+1}} / T^t_{g_t g_{t+1}}$$

where $R^t_{gt\ gt+1}$ is the number of cards recovered at time t with g_t calls at the beginning of the day and g_{t+1} calls at the end of the day; and $T^t_{gt\ gt+1}$ is the number of cards at time t with g_t calls. Note that $g_{t+1} \in \{g_t, g_{t+1}\}$ because of the assumption that at most each cardholder can be called once a day. In order to describe this rate in terms of probability, a notion of discrete time survival analysis will be introduced, which was proposed by Singer and Willet (1993).

Generally, Survival Analysis is a procedure for data analysis where the variable of interest is time until an event occurs (denoted as T). The *Hazard-Function* (h) is the probability that one random chosen individual experience the event in time t given that has not experienced it yet.

$$h(t) = Pr[T = t | T \geq t]$$

The *Survivor Function* (S) gives the probability that an individual does not experience the event at some specified time t, and we can calculate it using the Hazard-Function:

$$S(t) = (1 - h(t)) \times S(t-1)$$

In our context, the rate $r^t_{gt\ gt+1}$ can be seen as a hazard function that depends not only on t but also on the variables G_t and G_{t+1} (number of calls at the beginning and end of the day respectively):

$$r^t_{g_t g_{t+1}} = Pr[T = t | T \geq t, G_t = g_t, G_{t+1} = g_{t+1}].$$

A given path until time t depends on the history of all the binary decisions that were made to get to t. That is, depends on $G_1 = g_1, G_2 = g_2, \ldots, G_t = g_t$. So we define the survival function associated to each path as:

$$S(t | G_1 = g_1, G_2 = g_2, \ldots, G_t = g_t) = \Pi^t_{i=1}(1 - r^i_{g_i g_{i+1}})$$

and thus, the recovery rate for each path is

$$\begin{aligned} r(t | G_1 = g_1, G_2 = g_2, \ldots, G_t = g_t) &= 1 - S(t | G_1 = g_1, G_2 = g_2, \ldots, G_t = g_t) \\ &= 1 - S(t|p) \end{aligned}$$

The recovery rate associated to a given path p can be obtained by 1-$S(t|p)$. This would be 1-$S(10|p)$ for the PDS. Given that balance recovery is more important than the number of recovered accounts, from here on we will use the balance weighted version of all the expressions above and all computations are analogous.

If there weren't any capacity restrictions, the problem would be solved by selecting the path p that maximizes 1-$S(10|p)$ for all possible paths, which can be done using *Dynamic Programming*. The main idea is to find the shortest paths from an initial node to a set of final nodes in an acyclic directed graph like ours. The next proposition suggests a method to find the shortest path between two nodes in a recursive way without calculating all the possible paths (Wolsey 1998).

Proposition 1: If $d_s(v)$ denotes the length of a shortest path from s to v, then

$$d_s(v) = \min_{k \in K} \{d_s(k) + c_{k,v}\}$$

where K is the set of all nodes that get to v (parents) and $c_{k,v}$ is the cost of going from node k to node v.

In our case, instead of adding the costs $c_{k,v}$, they will be used as a factor. These "costs factors" are the probability of staying in PDS associated from moving from one node to another, that is 1-$r^t_{gt\ gt+1}$. Based on this idea one can get the path that minimizes the survival probability, that is, a path that maximizes the recovery rate.

As it was said before, there are different risk groups in the collection strategy. These groups show different levels of historical recovery rates so these will be calculated separately for each group and thus will have different optimal paths.

Even when we have already identified the paths with better recovery for each risk-level, the capacity restrictions might not allow to follow these paths. Therefore, to determine the portfolio strategy it is necessary to select feasible paths for each risk-level that fulfill the restrictions and at the same time maximize the recovery rate. In addition to the risk level, the different billing dates should be considered in order to achieve the daily capacity constraints. Each different billing date will be called as *cycle*. Portfolio optimization is the step at which one decides whether or no to call daily each cardholder from each risk level and cycle combination. Mathematically, it is defined as a *Binary Lineal Program* as will be explained next. First, some notation will be introduced.

$$x_{i,j}^{NC} = \begin{cases} 1 & si\ se\ llama\ al\ grupo\ i, ciclo\ j \\ 0 & si\ no\ se\ llama\ al\ grupo\ i, ciclo\ j \end{cases}$$

$$x_{i,j}^{NC} = 1 - x_{i,j}^{C}$$

The current number of calls each cardholder from group *i* cycle *j*, has received will be denoted by C_{ij} whereas the number of card-holders *available* to be called will be denoted by V_{ij}. Finally, wr_{ij}^{C} and wr_{ij}^{NC} will denote, respectively, the proportion of the total balance to be recovered for calling or not calling group *i*, cycle *j*. These will be calculated in terms of $r^{t}_{gt\ gt+1}$ and the fraction that the balance of group *i* and cycle *j* represent of the total balance (which we will denote by $w_{i,j}$). Specifically, the calculation is done as follows:

$$wr_{ij}^{C} = r_{g_t g_t+1}^{t} \times w_{i,j}$$

and

$$wr_{ij}^{NC} = r_{g_t g_t}^{t} \times w_{i,j}.$$

Notice that quantities $r^{t}_{gt\ gt+1}$ *can not be used directly, since they represent the expected recovery fraction of the balance of group i* and cycle *j*. Hence, adding them could naturally result in a greater than one recovery proportion.

Having said that, one needs to solve the following integer programming problem:

$$minimize \quad \sum_{i=1}^{7}\sum_{j=1}^{C} wr_{ij}^{C}\, x_{ij}^{C} + \sum_{i=1}^{7}\sum_{j=1}^{C} wr_{ij}^{NC}\, x_{ij}^{NC}$$

$$subject\ to \quad x_{ij}^{C} + x_{ij}^{NC} = 1$$

$$(C_{ij} + 1)\, x_{ij}^{C} + C_{ij}\, x_{ij}^{NC} - (C_{i(j+1)} + 1)\, x_{i(j+1)}^{C} - C_{i(j+1)}\, x_{i(j+1)}^{NC} \geq 0$$

$$\sum_{i=1}^{7}\sum_{j=1}^{C} V_{ij}\, x_{ij}^{C} \geq LB$$

$$\sum_{i=1}^{7}\sum_{j=1}^{C} V_{ij}\, x_{ij}^{C} \leq UB$$

$$x_{ij}^{C},\ x_{ij}^{NC} \in \{0,1\} \quad i = 1,\ldots,7 \quad j = 1,\ldots,C$$

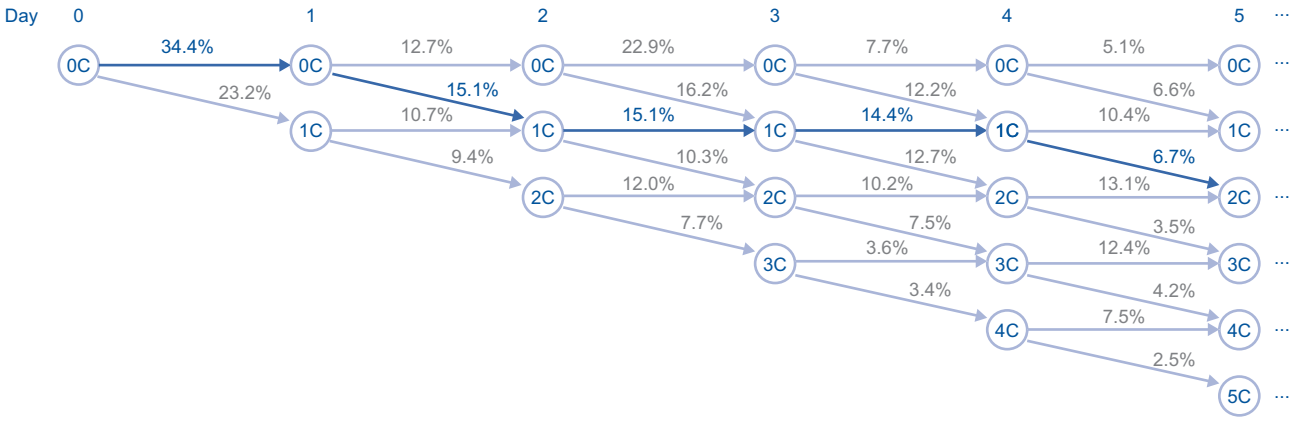
where *C* denotes the number of cycles available to be called.

The first constraint guarantees that a decision will be made for each group-cycle combination. The second constraint guarantees that order in terms of calls made to each group-cycle combination will be maintained. That is, no group will be called more times than a riskier group. The last two constraints guarantee that at least *LB* calls will be made and no more than *UB*. All the practical considerations and data used will be described in the next section.

3.d.3 Results

The analysis was done for each of the groups: 5 of them are meant to order credit cards from the highest risk ones to the lowest, being group 1, the riskiest group. Next, we will show the graph actually used for group 3, which is the middle riskgroup. Paths will not be shown completely, but only up to the first 5 days.

Diagram 3.d.3
PD stage subpaths. Up to day 5



Source: BBVA Bancomer

For instance, the interpretation of the path shown in blue is that one should not call on day 1, do call on day 2, avoid calling on days 3 and 4, and call once again on day 5.

Finally, we briefly show the way the recovery rate at time *t* is calculated.

For example, at time 2 there are 9,482 active credit cards which have been called once up to time 1 and which were not called again at time 2. These cards sum up a total balance of 253.2 millions pesos, 27 of which correspond to cards that pay at exactly time 2. Hence, it is expected to have a recovery rate in terms of balance of 10.7% at time 2, from these cards.

Table 3.d.1
Calculations of the recovery rate at time *t*

t	i	f	R (millions)	T (millions)	r	T (number of accounts)
1	0	0	1,348.5	3,917.0	34.4%	195,735
1	0	1	154.4	666.0	23.2%	21,640
2	0	0	179.2	1,409.5	12.7%	90,658
2	0	1	163.0	1,081.0	15.1%	34,319
2	1	1	27.0	253.2	10.7%	9,482
2	1	2	22.1	235.4	9.4%	6,422
3	0	0	175.5	765.4	22.9%	62,756
3	0	1	60.4	372.8	16.2%	12,089
3	1	1	85.0	561.5	15.1%	19,838
3	1	2	47.3	460.9	10.3%	15,058
3	2	2	8.9	73.6	12.0%	2,203
3	2	3	8.3	108.7	7.7%	3,028

Source: BBVA Bancomer

The next step is to apply the dynamic programming model. As it was discussed in the methodology section there are two different cases to consider in the dynamic programming.

Cycles that start today

In this case we have all possible paths to be considered. The objective is to find for each cycle of each risk-level the path with highest recovery rate for each possible number of calls. In the table 3.d.2 are the results of dynamic programming for cycle 2 of the third risk-level.

Table 3.d.2
Results of dynamic programming for cycle 2 of the third level of risk

Number of calls	Recovery rate	Calls									
0	48.26%	0	0	0	0	0	0	0	0	0	0
1	52.99%	0	1	1	1	1	1	1	1	1	1
2	57.00%	0	1	1	1	2	2	2	2	2	2
3	58.53%	0	1	1	1	2	3	3	3	3	3
4	57.96%	0	1	1	1	2	3	3	3	3	4
5	55.31%	0	1	1	1	2	3	4	4	5	5
6	54.74%	0	1	1	1	2	3	4	4	5	6
7	49.65%	0	1	2	3	3	4	5	6	6	7

Source: BBVA Bancomer

Cycles that began in earlier days

Since the cycle began earlier we have already made some calls, which restrict the paths to be consider in the dynamic programming. Table 3.b.3 contains the results of dynamic programming for the cycle 7 of the third level of risk.

Table 3.d.3
Results of dynamic programming for cycle 7 of the third level of risk

Number of calls	Recovery rate	Calls									
2	57.00%	0	0	1	1	2	2	2	2	2	2
3	58.53%	0	0	1	1	2	3	3	3	3	3
4	57.96%	0	0	1	1	2	3	3	3	3	4
5	55.31%	0	0	1	1	2	3	4	4	5	5
		Calls made					Possible paths				

Source: BBVA Bancomer

Now the portfolio optimization is to be done to choose one path for each cycle - risk-level.

Once each card has been assigned a specific number of calls made up to its most recent day at PD stage, one is ready to solve the so-called *portfolio optimization*.

Next we show an example of some of the variables used in the optimization problem. For instance, at update 7, for cards in cycles 7 and 17 in the middle risk group, live cards parameters for the linear program are $V_{3,7}$ = 2,532 and $V_{3,17}$ = 7,356. That is, there are 2,532 cards available to be called from group 3 (middle risk) and cycle 7.

As for the weighted recovery quantities, only one possibility (optimal) exists for cards in group 3 and cycle 7: stay with the same number of calls. Therefore, $r^7_{2,2}$ = 0.0526 for the middle group and $wr^{NC}_{3,7}$ = 0.000619 since the weight used is $w_{3,7}$ = 0.0117, which is the proportion of blance in group 3 and cycle 7, of the whole credit cards portfolio. The computation is analogous for cycle 17, being $wr^{NC}_{3,17}$ = 0.0106, since again its only option is to stay with the same quantity of calls.

Order constraints for cycle 7, considering the whole set of groups have the following parameters: $C_{1,7}$ = 2, $C_{2,7}$ = 2, $C_{3,7}$ = 2, $C_{4,7}$ = 1 and $C_{5,7}$ = 1. Hence, if cards in group 1 are not called, cards in group 2 will not be called either, since they would have more cumulated calls than group 1, and order constraint would be violated. Also, if cards in group 4 are called, then cards in group 5 are free to be called or not be called.

Finally, the actual parameters used as lower and upper bounds for update 7 were *LB* = 62,419 and *UB* = 69,354.

As mentioned before, recovery rates and optimal paths were all estimated using September 2014 data. The technique was tested with October 2014 data and next, we show the results. First, we show the decisions the model suggested for some group-cycle combinations, for the first few days of testing.

Table 3.d.4
Model results

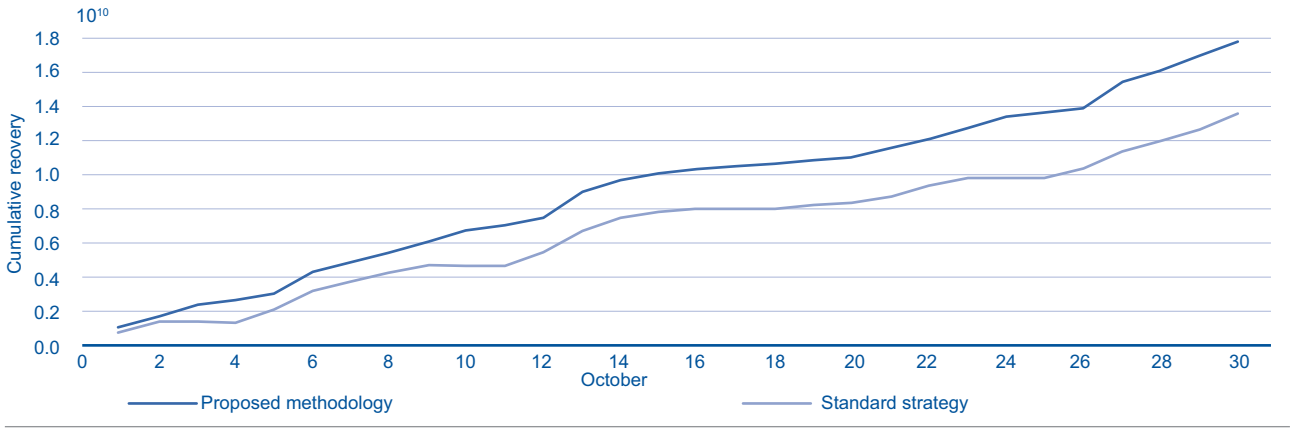
Cycle	Group	September									October			
		22	23	24	25	26	27	28	29	30	1	2	3	4
1	1	0	1	1	2	3	3	3	4	4	4			
	2	0	1	1	1	2	3	3	3	3	4			
	3	0	1	1	2	2	3	3	3	3	4			
	4	0	0	0	1	2	2	2	3	3	3			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0	0	0	0	0	0	0	0	0	0			
	7	1	2	2	3	4	4	4	4	4	5			
2	1	0	1	1	2	3	3	3	4	4	4			
	2	0	1	1	1	2	3	3	3	3	4			
	3	0	1	1	2	2	3	3	3	3	4			
	4	0	0	0	1	2	2	2	3	3	3			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0	0	0	0	0	0	0	0	0	0			
	7	1	2	2	3	4	4	4	4	4	5			
3	1		0	1	1	2	3	3	3	4	4	4		
	2		0	1	1	1	2	3	3	3	3	4		
	3		0	1	1	2	2	3	3	3	3	4		
	4		0	0	0	1	2	2	2	3	3	3		
	5		0	0	0	0	0	0	0	0	0	0		
	6		0	0	0	0	0	0	0	0	0	0		
	7		1	2	2	3	4	4	4	4	4	5		

Source: BBVA Bancomer

The table is read as follows: the model suggests not to call cards on group 1 and cycle 1, for it says those cards should stay with 4 cumulative calls up to October 1. On the other hand, it says cardholders on group 2 and cycle 2, should do be called on the first day of October.

The process was repeated on a daily basis for testing purposes using October data. Next, we show the recovery actually achieved by a commonly used methodology in the industry and the one obtained by the proposed model.

Figure 3.d.1
Standard-industry strategy vs. proposed methodology comparison



Source: BBVA Bancomer

3.d.4 Discussion

So far we have fully explained the proposed methodology and even when the results are satisfactory when compared to common collection strategies within the industry, there are still some details that could be improved.

In this paper we are only considering 10 days with a total of 1'024 paths although if we add 5 more days the total paths increases to 32'768. This disproportionate rise in the number of paths, can become a problem as we could have paths sparsely populated and recovery rates could be volatile and affect the results. So it is important to perform an analysis of the population with which daily recoveries are calculated prior to the Dynamic Programming phase.

Intuitively, it is expected that higher risk-levels have a greater number of calls than lower risk-levels. Therefore, an order restriction in which calls are prioritized considering the level of risk is added. Although this restriction may change as the needs of the problem ,for example, if a particular day has not obtained the expected recovery rate in some segment could change this restriction to prioritize it.

In this article 7 segments that group accounts in risk-levels were used. But it is important to say that these could be of a different nature, as long as they have sufficient population and have significantly different rates of recovery. This flexibility in the definition of the segments allows the model to be used in different problems.

It is important to emphasize that recovery rates have constant changes and we seek the model to be sensitive to these changes, hence the best is to fit the model daily. We intuitively know that the recovery rates have a seasonal behavior, so the model attempts to capture this effect by moving the window used to calculate the recovery rates. Although it would be interesting to include this effect in a more efficient way, one could also include other phenomena relevant to the collection process such as demographic and socioeconomic characteristics of cardholders.

3.d.5 Conclusions

A novel methodology was proposed for optimizing the collection process, which according to Filho (2010), is a quite insufficiently studied problem within the operations research area.

The initial ideas were taken from his 2010 paper, and further developed. The methodology achieves to strongly combine three broad areas of study: survival analysis, dynamic programming and linear programming.

The results of an actual deployment of the proposed methodology or a pilot program would be particularly interesting, given that historically the collecting process has been done by means of experience knowledge and rules of thumb. Theoretically, the proposed methodology should behave better than expert criteria.

Further study should focus on modelling the recovery rates in function of more variables than time and the transition type in terms of calls. A model involving the risk-level group, time within the year and demographic variables at the cardholder level could give more robust estimates.

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4. Statistical Appendix

Table 4.1

Financial savings: Balances in billions of November 2015 pesos

	IV 04	IV 05	IV 06	IV 07	IV 08	IV 09	IV 10	IV 11	IV 12	IV 13	IV 14	III 15	Strc. % III 15
M4a	6,457	7,176	7,797	8,357	9,160	9,382	10,065	11,213	12,398	12,966	13,934	14,548	
- Bills and coins held by the public	458	495	551	586	633	664	709	759	808	839	945	968	
= Financial savings	5,999	6,681	7,245	7,770	8,527	8,718	9,356	10,454	11,590	12,126	12,989	13,581	100.0
I. Depository institutions	**2,547**	**2,729**	**2,735**	**2,980**	**3,337**	**3,355**	**3,512**	**3,722**	**3,925**	**4,064**	**4,353**	**4,700**	**34.6**
Development banks	399	478	400	379	403	420	424	444	483	523	576	623	4.6
Resident commercial banks (demand + term)	2,071	2,168	2,238	2,476	2,799	2,786	2,923	3,093	3,249	3,358	3,566	3,843	28.3
Demand	1,044	1,173	1,278	1,402	1,449	1,517	1,661	1,812	1,908	2,037	2,220	2,389	17.6
Term	1,027	995	960	1,074	1,350	1,269	1,262	1,281	1,341	1,320	1,347	1,455	10.7
Foreign agencies of commercial banks	59	62	73	99	107	91	101	118	122	98	120	136	1.0
Savings & Loan Associations (S&L)	17	21	24	26	27	59	64	67	70	85	90	98	0.7
II. Securities issued by the public sector	**2,491**	**2,932**	**3,452**	**3,668**	**3,769**	**3,945**	**4,375**	**5,171**	**6,086**	**6,420**	**7,000**	**7,107**	**52.3**
Securities issued by the Federal Government	1,369	1,556	2,127	2,434	2,654	2,824	3,138	3,821	4,656	4,907	5,443	5,540	40.8
Brems	302	345	123	16	1	1	1	0	0	0	0	0	0.0
IPAB bonds	512	620	715	773	671	645	682	726	776	782	774	730	5.4
Other public securities	308	411	488	446	443	475	554	624	654	732	783	837	6.2
III. Securities issued by private companies	**311**	**314**	**351**	**406**	**394**	**379**	**393**	**437**	**431**	**461**	**437**	**510**	**3.8**
IV. SAR outside of Siefores	**582**	**643**	**707**	**717**	**1,027**	**1,039**	**1,075**	**1,124**	**1,148**	**1,182**	**1,199**	**1,263**	**9.3**
Financial savings = I + II + III + IV	**5,929**	**6,619**	**7,245**	**7,770**	**8,527**	**8,718**	**9,356**	**10,454**	**11,590**	**12,126**	**12,989**	**13,581**	**100.0**
Instruments included in financial savings													
Siefores	728	864	1,018	1,129	1,197	1,392	1,615	1,761	2,055	2,122	2,371	2,466	
Public sector securities held by foreigners	119	167	205	310	357	403	753	1,180	1,887	2,036	2,324	2,365	
Investment funds (only debt**)	499	637	829	955	862	986	1,205	1,206	1,346	1,352	1,419	1,474	
Investment funds (debt and equity***)	605	751	999	1,172	1,016	1,181	1,462	1,476	1,658	1,738	1,888	1,992	
Financial savings without SAR total***	4,620	5,112	5,521	5,924	6,303	6,288	6,665	7,569	8,387	8,822	9,419	9,851	
SAR Total (Siefores and non-Siefores)	1,310	1,507	1,725	1,846	2,224	2,431	2,690	2,885	3,203	3,304	3,571	3,729	
Real annual percentage change,%													
M4a	6.5	11.1	8.6	7.2	9.6	2.4	7.3	11.4	10.6	4.6	7.5	6.2	
=- Bills and coins held by the public	8.6	8.0	11.4	6.4	7.9	4.9	6.9	7.0	6.4	3.9	12.5	18.4	
= Financial savings *	6.4	11.4	8.4	7.2	9.7	2.2	7.3	11.7	10.9	4.6	7.1	5.4	
I. Depository institutions	**5.4**	**7.2**	**0.2**	**9.0**	**12.0**	**0.5**	**4.7**	**6.0**	**5.5**	**3.5**	**7.1**	**13.0**	
Development banks	-0.7	19.8	-16.4	-5.1	6.4	4.1	1.1	4.6	9.0	8.3	10.1	9.7	
Resident commercial banks (demand + term)	6.3	4.7	3.2	10.6	13.1	-0.5	4.9	5.8	5.0	3.4	6.2	13.4	
Demand	3.8	12.4	8.9	9.7	3.4	4.7	9.5	9.1	5.3	6.8	9.0	12.7	
Term	9.0	-3.1	-3.5	11.9	25.7	-6.0	-0.5	1.5	4.7	-1.6	2.0	14.6	
Foreign agencies of commercial banks	13.4	4.4	18.3	34.7	9.0	-15.1	10.5	17.0	3.5	-19.8	22.7	24.8	
Savings & Loan Associations (S&L)	19.4	19.0	16.6	9.3	2.4	115.8	9.3	4.3	5.5	20.5	6.6	3.0	
II. Securities issued by the public sector	**3.4**	**17.7**	**17.7**	**6.3**	**2.7**	**4.7**	**10.9**	**18.2**	**17.7**	**5.5**	**9.0**	**0.9**	
Securities issued by the Federal Government	-8.5	13.6	36.7	14.4	9.0	6.4	11.1	21.8	21.9	5.4	10.9	2.2	
Brems	24.2	14.3	-64.5	-86.9	-91.9	-3.1	-4.3	-100.0	.	.	.	.	
IPAB bonds	21.3	21.2	15.3	8.1	-13.2	-3.8	5.7	6.4	6.9	0.7	-1.0	-13.1	
Other public securities	24.3	33.6	18.7	-8.7	-0.6	7.1	16.8	12.7	4.7	11.9	7.0	6.7	
III. Securities issued by private companies	**10.7**	**1.2**	**11.7**	**15.4**	**-2.9**	**-3.7**	**3.6**	**11.2**	**-1.2**	**6.8**	**-5.3**	**10.5**	
IV. SAR outside of Siefores	**8.8**	**10.6**	**9.9**	**1.3**	**43.4**	**1.1**	**3.5**	**4.5**	**2.1**	**2.9**	**1.5**	**4.1**	
Financial savings = I + II + III + IV	**5.1**	**11.6**	**9.5**	**7.2**	**9.7**	**2.2**	**7.3**	**11.7**	**10.9**	**4.6**	**7.1**	**5.4**	
Instruments included in financial savings													
Siefores	13.4	18.6	17.9	11.0	6.0	16.3	16.0	9.0	16.7	3.3	11.7	6.5	
Public sector securities held by foreigners	201.0	39.8	22.9	51.6	14.9	13.1	86.7	56.7	59.9	7.9	14.2	6.6	
Investment funds (only debt**)	0.9	27.8	30.1	15.2	-9.7	14.4	22.2	0.1	11.6	0.4	5.0	-0.4	
Investment funds (debt and equity***)	4.1	24.2	32.9	17.3	-13.3	16.2	23.9	0.9	12.3	4.9	8.6	2.3	
Financial savings without SAR total***	3.5	10.7	8.0	7.3	6.4	-0.2	6.0	13.6	10.8	5.2	6.8	5.3	
SAR Total (Siefores and non-Siefores)	11.3	15.1	14.5	7.0	20.5	9.3	10.7	7.2	11.0	3.2	8.1	5.7	

Source: Banco de Mexico (broad monetary aggregates) and INEGI

Table 4.2

Credit and Financing to the Private Sector: Balances in billions of November 2015 pesos

	IV 04	IV 05	IV 06	IV 07	IV 08	IV 09	IV 10	IV 11	IV 12	IV 13	IV 14	III 15*	Struc. % III 15
Total: All categories	3,528	3,709	4,305	4,881	5,172	4,935	5,164	5,852	6,065	6,551	7,049	7,779	100.0
Bank	1,180	1,338	1,678	2,058	2,205	2,109	2,205	2,489	2,681	2,866	2,998	3,277	42.1
Non-bank	2,348	2,371	2,627	2,823	2,967	2,825	2,959	3,364	3,384	3,686	4,051	4,502	57.9
Total consumer	392	544	689	786	743	651	654	744	833	904	925	959	12.3
Bank	277	405	554	671	626	506	505	602	694	740	758	805	10.4
Non-bank	115	139	135	116	117	145	149	142	139	164	167	154	2.0
Total housing	1,013	1,072	1,178	1,406	1,422	1,442	1,508	1,589	1,664	1,697	1,763	1,891	24.3
Bank	214	268	345	395	418	439	468	488	515	534	556	600	7.7
Non-bank	799	804	833	1,011	1,005	1,003	1,040	1,101	1,149	1,164	1,208	1,291	16.6
Total companies	2,122	2,093	2,438	2,689	3,006	2,841	3,002	3,520	3,568	3,950	4,361	4,929	63.4
Bank	689	666	779	992	1,161	1,164	1,232	1,399	1,471	1,591	1,685	1,872	24.1
Non-bank	1,434	1,427	1,659	1,697	1,845	1,677	1,770	2,121	2,096	2,359	2,676	3,056	39.3
Real annual percentage change, %													
Total: All categories	3.1	5.1	16.1	13.4	6.0	-4.6	4.6	13.3	3.6	8.0	7.6	14.0	
Bank	3.7	13.4	25.4	22.6	7.1	-4.3	4.5	12.9	7.7	6.9	4.6	11.4	
Non-bank	2.9	1.0	10.8	7.5	5.1	-4.8	4.7	13.7	0.6	8.9	9.9	16.0	
Total consumer	37.2	38.7	26.6	14.1	-5.5	-12.4	0.4	13.7	12.1	8.5	2.3	3.7	
Bank	41.0	46.1	36.9	21.1	-6.6	-19.2	-0.2	19.2	15.4	6.6	2.3	5.7	
Non-bank	28.9	21.0	-3.2	-14.3	1.4	24.1	2.8	-5.0	-2.0	17.7	2.2	-5.2	
Total housing	7.4	5.8	9.9	19.3	1.2	1.4	4.5	5.4	4.8	2.0	3.9	6.2	
Bank	-4.0	25.1	28.9	14.6	5.7	5.2	6.5	4.2	5.6	3.6	4.0	9.0	
Non-bank	11.0	0.6	3.6	21.3	-0.6	-0.2	3.7	5.9	4.4	1.3	3.8	4.9	
Total companies	-3.2	-1.4	16.5	10.3	11.8	-5.5	5.7	17.3	1.4	10.7	10.4	19.7	
Bank	-4.2	-3.3	17.0	27.3	17.0	0.2	5.9	13.6	5.2	8.2	5.8	14.9	
Non-bank	-2.7	-0.5	16.2	2.3	8.8	-9.1	5.5	19.8	-1.2	12.5	13.5	22.9	
Percentage of GDP, %													
Total: All categories	25.4	25.4	27.9	29.8	32.8	31.3	31.2	32.9	34.0	36.8	38.5	42.4	
Bank	8.5	9.2	10.9	12.5	14.0	13.4	13.3	14.0	15.0	16.1	16.4	17.8	
Non-bank	16.9	16.3	17.0	17.2	18.8	17.9	17.9	18.9	19.0	20.7	22.1	24.5	
Total consumer	2.8	3.7	4.5	4.8	4.7	4.1	3.9	4.2	4.7	5.1	5.1	5.2	
Bank	2.0	2.8	3.6	4.1	4.0	3.2	3.0	3.4	3.9	4.2	4.1	4.4	
Non-bank	0.8	1.0	0.9	0.7	0.7	0.9	0.9	0.8	0.8	0.9	0.9	0.8	
Total housing	7.3	7.4	7.6	8.6	9.0	9.1	9.1	8.9	9.3	9.5	9.6	10.3	
Bank	1.5	1.8	2.2	2.4	2.6	2.8	2.8	2.7	2.9	3.0	3.0	3.3	
Non-bank	5.8	5.5	5.4	6.2	6.4	6.4	6.3	6.2	6.4	6.5	6.6	7.0	
Total companies	15.3	14.4	15.8	16.4	19.0	18.0	18.1	19.8	20.0	22.2	23.8	26.8	
Bank	5.0	4.6	5.1	6.0	7.4	7.4	7.4	7.9	8.3	8.9	9.2	10.2	
Non-bank	10.3	9.8	10.8	10.3	11.7	10.6	10.7	11.9	11.8	13.2	14.6	16.6	
Infrastructure and Number of Bank Cards - Units													
ATMs	20,416	22,900	25,687	29,333	29,640	33,648	35,942	36,427	40,194	40,811	42,931	44,746	
POS terminals	160,289	201,852	305,144	418,128	446,025	446,792	482,299	523,578	556,273	630,389	730,870	795,049	
Branches*	7,788	7,972	8,404	9,230	10,722	10,731	11,291	11,785	12,407	12,581	12,698	12,266	
Number of current cards at the end of the quarter (figures in millions)													
Credit (Source: CNBV)[1]	11.6	14.7	21.4	24.8	30.7	25.8	23.9	27.6	25.9	26.9	28.0	24.4	
Credit (Source: Banxico)						12.7	13.3	14.5	15.8	16.4	16.1	nd	
Debit	31.8	36.1	51.7	51.9	47.0	52.3	61.7	74.0	85.3	100.2	104.2	105.5	

Continue on the following page

Credit and Financing to the Public Sector: Balances in billions of November 2015 pesos

	IV 04	IV 05	IV 06	IV 07	IV 08	IV 09	IV 10	IV 11	IV 12	IV 13	IV 14	III 15*	Struc. % III 15
Commercial bank credit	318	319	236	232	201	333	371	391	432	428	514	539	5.4
Federal government	129	81	44	40	28	40	51	41	14	32	51	55	0.6
States & Municipalities	81	89	76	87	111	172	225	243	302	302	309	309	3.1
Decentral. gov't agen.	108	149	116	105	62	121	95	107	116	94	154	174	1.8
Development bank credit	187	194	182	175	181	141	147	142	164	177	215	226	2.3
Federal government	97	111	93	111	115	57	63	29	35	35	59	70	0.7
States & Municipalities	37	36	37	38	33	50	56	89	110	129	138	138	1.4
Decentral. gov't agen.	53	47	51	26	33	34	28	24	19	13	17	18	0.2
Debt issued in the country	2,830	3,252	3,792	4,086	4,292	4,689	4,961	5,721	6,311	6,907	7,351	7,741	78.0
Federal government	1,581	1,727	2,221	2,448	2,587	2,940	3,023	3,286	3,586	3,953	4,296	4,586	46.2
States & Municipalities	31	31	51	61	66	68	70	76	78	91	98	99	1.0
Decentral. gov't agen.	75	158	202	201	204	242	323	402	444	515	571	624	6.3
IPAB	582	727	840	940	927	942	923	953	940	954	905	934	9.4
Banco de Mexico	354	382	243	247	319	306	431	813	1,072	1,204	1,291	1,307	13.2
FARAC	207	226	235	188	189	191	190	190	191	190	190	191	1.9
External financing	1,019	914	641	629	739	786	836	976	963	1,000	1,178	1,414	14.3
Credit and financing Total	4,354	4,678	4,852	5,122	5,412	5,950	6,314	7,230	7,869	8,512	9,258	9,919	100.0
Real annual percentage change in the balance, %													
Commercial bank credit	-21.0	0.4	-25.8	-2.0	-13.3	65.9	11.2	5.5	10.4	-0.9	20.1	20.9	
Federal government	-56.0	-37.4	-46.0	-8.9	-29.5	43.0	27.1	-20.3	-64.9	122.2	59.6	55.4	
States & Municipalities	96.1	10.6	-14.4	14.4	27.4	54.5	31.0	8.1	24.1	0.0	2.4	4.5	
Decentral. gov't agen.	60.4	38.1	-21.8	-10.2	-41.0	97.0	-22.1	13.4	7.9	-18.5	63.3	52.6	
Development bank credit	-0.6	3.4	-6.3	-3.5	3.0	-22.1	4.5	-3.3	15.4	7.9	21.5	16.4	
Federal government	0.7	14.3	-16.2	19.2	3.5	-50.1	9.7	-54.3	22.9	-2.2	71.8	49.3	
States & Municipalities	128.4	-4.4	4.9	1.2	-13.2	50.3	12.8	59.2	23.3	18.1	6.7	2.6	
Decentral. gov't agen.	-30.1	-11.4	8.7	-48.4	24.5	3.4	-16.4	-13.7	-22.2	-32.1	35.1	40.1	
Debt issued in the country	6.9	14.9	16.6	7.7	5.0	9.3	5.8	15.3	10.3	9.5	6.4	5.0	
Federal government	3.3	9.3	28.6	10.2	5.7	13.7	2.8	8.7	9.1	10.2	8.7	4.2	
States & Municipalities	37.7	0.8	65.7	18.1	8.5	3.6	2.9	8.0	2.8	16.9	6.9	2.3	
Decentral. gov't agen.	212.8	108.9	28.4	-0.7	1.5	18.7	33.4	24.4	10.4	16.1	10.8	12.1	
IPAB	17.8	25.0	15.5	12.0	-1.4	1.6	-2.1	3.3	-1.4	1.5	-5.0	-0.5	
Banco de Mexico	-4.7	7.9	-36.4	1.7	29.2	-4.3	41.1	88.5	31.9	12.2	7.2	9.9	
FARAC	0.7	9.6	3.8	-19.9	0.3	1.0	-0.1	-0.2	0.4	-0.2	0.1	0.0	
External financing	-2.9	-10.3	-29.8	-2.0	17.5	6.4	6.3	16.7	-1.3	3.8	17.8	32.2	
Credit and financing Total	1.5	7.4	3.7	5.6	5.7	9.9	6.1	14.5	8.8	8.2	8.8	9.2	
Credit and Financing: Percentage of GDP, %													
Commercial bank credit	3.6	3.8	2.8	2.6	2.4	4.0	4.2	4.2	4.8	4.6	5.3	5.6	
Federal government	0.6	0.6	0.5	0.5	0.7	1.1	1.4	1.4	1.7	1.7	1.7	1.7	
States & Municipalities	0.8	1.0	0.8	0.6	0.4	0.8	0.6	0.6	0.7	0.5	0.8	0.9	
Decentral. gov't agen.	2.3	2.2	1.5	1.4	1.3	2.1	2.2	2.2	2.4	2.4	2.8	2.9	
Development bank credit	1.3	1.3	1.2	1.1	1.1	0.9	0.9	0.8	0.9	1.0	1.2	1.2	
Federal government	0.7	0.8	0.6	0.7	0.7	0.4	0.4	0.2	0.2	0.2	0.3	0.4	
States & Municipalities	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.5	0.6	0.7	0.8	0.7	
Decentral. gov't agen.	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	
Debt issued in the country	20.4	22.3	24.6	24.9	27.2	29.7	29.9	32.1	35.4	38.8	40.1	42.2	
Federal government	11.4	11.8	14.4	14.9	16.4	18.6	18.2	18.5	20.1	22.2	23.5	25.0	
States & Municipalities	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	
Decentral. gov't agen.	0.5	1.1	1.3	1.2	1.3	1.5	1.9	2.3	2.5	2.9	3.1	3.4	
IPAB	4.2	5.0	5.4	5.7	5.9	6.0	5.6	5.4	5.3	5.4	4.9	5.1	
Banco de Mexico	2.5	2.6	1.6	1.5	2.0	1.9	2.6	4.6	6.0	6.8	7.1	7.1	
FARAC	1.5	1.6	1.5	1.1	1.2	1.2	1.1	1.1	1.1	1.1	1.0	1.0	
External financing	7.3	6.3	4.2	3.8	4.7	5.0	5.0	5.5	5.4	5.6	6.4	7.7	
Credit and financing Total	32.7	33.7	32.7	32.4	35.4	39.5	40.1	42.6	46.5	50.0	53.1	56.7	

* Preliminar data subject to revision

1/ Figures on the number of credit cards by CNBV and Banxico differ because CNBV include total number of cards. Banxico's figures correspond only to widespread acceptance cards, granted to persons, that are current on their payments and that, in the reported period, use their credit card.

Source: Banco de México for Credit and Financing to the Private Sector and Number of current cards. CNBV for operational data. Banco de México, CNBV and SHCP for Credit and Financing to the Public Sector; and INEGI for GDP data

5. Main Reforms to the Commercial Bank Regulatory Framework

Table 5.1
Main Reforms to the Commercial Bank Regulatory Framework: 2015

Subject	Scope of the Reform	Publication in the OGF*
1. **CNBV** - Resolution amending the general provisions applicable to credit institutions (71a)	Adjustments arising from the Financial Reform, including ring fencing, the inclusion of resolution plans in the form of living wills and the assessment of capital adequacy under supervisory scenarios (an annual assessment to determine whether or not there is sufficient capital to cover losses under certain circumstances, including adverse economic conditions, and requirements for capital projection to be prepared in the event of insufficient capital). The reform allows the CNBV to request banks information concerning risk and financial management, and business strategies of the business groups and consortia to which they belong, or of business entities with whom they have business or equity links.	9 January 2015
2. **CNBV** - Resolution amending the general provisions applicable to credit institutions (72a)	Definition of the eligibility by which clients other than institutional investors may issue instructions to trading desks. For this, the reform requires having had investments of at least 20 million UDIs in the previous year, having the necessary IT mechanisms and the signing of a statement acknowledging all associated risks.	9 January 2015
3. **SHCP** - General provisions regulating rating services offered by credit information companies	Modifications resulting from the Financial Reform, including the definition of terms under which credit information companies can offer credit scoring services (regarding capacity for payment and indebtedness) to its users and customers. Credit Information companies may now provide such information to financial entities without the authorisation of the customer as long as no confidential information is revealed (merchants and unregulated SOFOMES will require customer authorisation), the establishment of additional controls, and IT and system security requirements, among other conditions.	9 January 2015
4. **CNBV** - Resolution amending the general provisions for the certification of independent external auditors and other professionals working in the field of preventing money laundering and the funding of terrorism.	Modifications designed to facilitate CNBV certification of independent external auditors, compliance officers and other professionals, in order for them to provide their services to entities and persons under its supervision, regarding the compliance with financial regulation concerning the prevention, detection and reporting of acts, omissions and operations that potentially covered by Articles 139 *Quáter* and 400 Bis of the Federal Penal Code.	13 March 2015
5. **Banxico** - Circular 7/2015 for the attention of Credit Institutions and the National Funding for the Development of Agriculture and Fisheries, Rural and Forest Land, concerning amendments to Circular 3/2012 (payroll mobility).	This circular reviews the procedure for the establishment of instructions for the transfer of funds from payroll accounts in which employers deposit wages, to others determined by the employees, in line with the reforms to the Transparency and Order in Financial Services Law, within the framework of Financial Reform.	20 March 2015
6. **CNBV / Banxico** - Resolution amending the general provisions applicable to payment instrument networks.	This resolution defines the Relevant Participants in card payment networks as the acquirers, aggregators, issuers, specialist companies, and credit card brand-holders, within such networks.	2 April 2015
7. **Banxico** - Rules governing derivative transactions.	Adjustments to regulations in line with new international standards. The 28-day Inter-Bank Interest Rate swaps are defined as standardised derivative transactions. Banks and brokerage firms will be required to trade these standardised transactions on stock markets or electronic platforms and to settle them through clearing houses.	17 April 2015

Table 5.1 (cont.)
Main Reforms to the Commercial Bank Regulatory Framework: 2015

Subject	Scope of the Reform	Publication in the OGF*
8. **Banxico** - Circular 9/2015, for the attention of credit institutions, regulated and unregulated multiple purpose financial institutions, Mexico's Popular and Community Financial Companies, savings and loan cooperatives, credit unions, credit institutions that act as fiduciaries for trusts that give credit to the public, as well as other companies that normally grant credit, regarding Amendments to Circular 21/2009 (Total Annual Cost – TAC).	Adjustments to the Total Annual Cost methodology, namely modifications of applicable assumptions for revolving credit estimations, as well as changes to disclosure of calculations.	27 April 2015
9. **CNBV** - General provisions applicable to credit institutions	Banks are allowed to operate in their reception and allocation systems with securities registered in the National Securities Registry or listed on the international listings system, issued through collective investment vehicles, listed and quoted on the stock market, which main purpose is to reproduce the performance of one or more indexes, financial assets or reference parameters.	29 May 2015
10. **CONDUSEF** - 10. CONDUSEF - REFORMS and additions to general provisions for the organisation and operation of the Bureau of Financial Institutions.	Minor adjustments including the provision of a 3-day period for the correction of errors in the information published in the Bureau of Financial Institutions by CONDUSEF.	29 May 2015
11. **CNBV** - General provisions applicable to credit institutions	Adjustments to the consumer credit provisioning methodology with regard to the use of guarantees. This is now in line with the applicable methodology for commercial loans and with the capitalisation framework. The treatment of first loss and *pari passu* coverage schemes has been included, along with details regarding the applicability of the loss-given-default treatment in the case of borrowers undergoing bankruptcy proceedings.	27 August 2015
12. **Banxico** - Circular 14/2015, for the attention of credit institutions, regarding the rules applicable to Legal Entity Identifiers (LEI).	Introduction of the Legal Entity Identifier (LEI) regime in line with international efforts within the G20 and the Financial Stability Board. The scope and types of transactions requiring counterparty LEI were set up, as well as matters relating to the establishment and powers of the local issuing units.	15 September 2015
13. **CNBV** - Resolution amending the general provisions applicable to credit institutions	Minor adjustments to capital adequacy assessments under supervisory scenarios. Banks' risk committees are allowed to approve the relevant report, in cases where the board of directors is not due to meet in time to comply with the corresponding requirements.	21September 2015
14. **CNBV** - Resolution amending the general provisions applicable to credit institutions	Various details concerning capitalisation arising from changes introduced through the Basel Committee's Regulatory Consistency Assessment Programme (RCAP).	29 October 2015
15. **CNBV** - Resolution amending the general provisions applicable to credit institutions	The reform features adjustments to the accounting standards of banks and of the applicable filing forms and reports.	9 November 2015
16. **CNBV** - Resolution amending the general provisions applicable to credit institutions	Adjustment to capital requirements concerning credit valuation adjustments on transactions involving derivative instruments, establishing that, in the event there is not at least one counterparty rating, a 2% risk rating will be employed.	13 November 2015
17. **CNBV** - Resolution amending the general provisions applicable to credit institutions	Adjustments to the consumer credit provisioning methodology (credit cards and other revolving credit) bearing in mind risks associated with payment behaviour and borrower indebtedness. Also, new variables are included (i.e., the time that the borrower has been a bank customer, loan balance and the information contained in the reports issued by credit bureaus), among others changes.	16 December 2015

Table 5.1 (cont.)
Main Reforms to the Commercial Bank Regulatory Framework: 2015

Subject	Scope of the Reform	Publication in the OGF*
18. **CNBV / Banxico** - Resolution amending general provisions concerning liquidity requirements for multiple banking institutions.	Amendments granting a stay of compliance of certain features of the Liquidity Coverage Ratio, and providing for the recognition of price vendor equivalents in foreign jurisdictions that may offer their services to banks. In the case of transactions with an agreed value date, compensation for transactions with the same counterpart will be permitted, within their existing master agreements.	31 December 2015
19. **CNBV** - Resolution amending the general provisions applicable to credit institutions	Multiple adjustments, including the incorporation of the Domestic Systemically Important Banks (DSIB) regime, treatments for the provisioning of mortgage portfolios originated and serviced by INFONAVIT and FOVISSSTE the rights to payment of which have been partially ceded, and for home improvement or remodelling portfolios guaranteed by a development bank or a trust constituted by the Federal Government.	31 December 2015

* OGF: Official Gazette of the Federation

6. Special Topics Included in Previous Issues

January 2015
Habits in bank credit card usage over time
The informal economy in Mexico: Determining factors in the transition to formality and the viability of this process
Employment mobility
International branchless banking experience

First Half 2014
Household indebtedness in Mexico: two approaches to measurement
Determining factors of financial inclusion in Mexico based on the ENIF 2012 survey

December 2013
Penetration of Credit in Mexico and Brazil: a comparison and brief description of some factors contributing to the difference
The outlook for Mutual Funds in Mexico
Is there market discipline in Mexico's Bank Debt market?
Demand factors that influence financial inclusion in Mexico: analysis of barriers based on the ENIF survey
The new Financial Reform

July 2013
Corporate Lending: Relationship between Amount, Company Size and Non-Performing Loan Ratio
Statistics of the National Banking and Securities Commission (CNBV) on Lending to SMEs by Federal State and Indicators in Judicial Proceedings Efficiency
Recent Patterns in Efficiency and Competition of the Mexican Banking System
Amendments to the Securities Market Act
Bank Lending to Companies: How Much Can It Grow With an Ideal Financial Reform?
What Does ENAMIN Tell Us About Bank Credit Needs among Microenterprises in Mexico?

November 2012
Use of Credit in the Different Productive Sectors: What does the 2009 Economic Census tell us?
Considerations Regarding the Segmentation of Firms
Financial Inclusion: Two Measurement and Methodology Exercises for Mexico
Penetration of Credit in Mexico: Evolution and Comparison with Some Latin American Countries
The Recent Expansion of Public Sector Banks in Brazil: Some Issues to Consider for Mexico
The Good Old Days of Foreign Entry to the Mexican Banking System: Review of the Winning Investigation of the 2012 Manuel Espinosa Yglesias Award

June 2012
The Good Weekend
A Comparison of the Different Sources of Information on Access to and Use of Bank Credit among Mexican Companies
Combined Use of Financial Services
Regulation for Systemically Important Financial Institutions (SIFIs)

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Mexico Banking Outlook
January 2016

Editorial Board

This report has been produced by

Editor:
Carlos Serrano
carlos.serranoh@bbva.com

Mariana Torán
mariana.toran@bbva.com

Sirenia Vázquez
sirenia.vazquez@bbva.com

Saidé A. Salazar
saidearanzazu.salazar@bbva.com

With collaboration of:
Alfonso Gurza
alfonso.gurza@bbva.com

BBVA Research

Group Chief Economist
Jorge Sicilia

Developed Economies:
Rafael Doménech
r.domenech@bbva.com

Spain
Miguel Cardoso
miguel.cardoso@bbva.com

Europe
Miguel Jiménez
mjimenezg@bbva.com

United States
Nathaniel Karp
nathaniel.karp@bbva.com

Emerging Economies:

Cross Country Emerging Markets Analysis
Álvaro Ortiz
alvaro.ortiza@bbva.com

Asia
Le Xia
le.xia@bbva.hk

Mexico
Carlos Serrano
carlos.serranoh@bbva.com

Turkey
Álvaro Ortiz
alvaro.ortiza@bbva.com

LatAm Coordination
Juan Ruiz
juan.ruiz@bbva.com

Argentina
Gloria Sorensen
gsorensen@bbva.com

Chile
Jorge Selaive
jselaive@bbva.com

Colombia
Juana Téllez
juana.tellez@bbva.com

Peru
Hugo Perea
hperea@bbva.com

Venezuela
Julio Pineda
juliocesar.pineda@bbva.com

Financial Systems & Regulation
Santiago Fernández de Lis
sfernandezdelis@bbva.com

Financial Systems
Ana Rubio
arubiog@bbva.com

Financial Inclusion
David Tuesta
david.tuesta@bbva.com

Regulation & Public Policy
María Abascal
maria.abascal@bbva.com

Digital Regulation
Alvaro Martín

Global Areas:

Economic Scenarios
Julián Cubero
juan.cubero@bbva.com

Financial Scenarios
Sonsoles Castillo
s.castillo@bbva.com

Innovation & Processes
Oscar de las Peñas
oscar.delaspenas@bbva.com

BBVA Research Mexico
Paseo de la Reforma 510
Colonia Juárez
C.P. 06600 México D.F.
Publications:
e-mail: bbvaresearch_mexico@bbva.com

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