Economic Watch

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Economic Analysis

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Inflation, influenced by slack in production factors

- The surprisingly low inflation figures over the last two years might suggest a permanent change in the medium term.
- We believe the surprising inflation figures are due to the accumulation of atypical and intense drops in the most volatile elements of the CPI basket and a lack of demand pressure. Slack on the markets of factors is the most influential aspect.
- This makes it reasonable to believe that the inflation rate in Q211, of 3.2% core inflation, should represent a floor from which there will be faster growth as market resource availability declines. Given the moderate activity at the global and domestic level, this rate will be sluggish.

In the face of significant inflation surprises, it is natural to ask whether there have been any changes in the process of determining prices in the economy. To try to answer this question we look at the factors that help explain variations in consumer prices as measured by both total CPI and the core index. The latter excludes from the basket the most volatile goods and those most exposed to changes in supply conditions (agricultural products) or discretionary choices (goods and services with administered prices), leaving an index with products more directly exposed to demand pressures, a potential source of inflation.

The surprisingly low inflation in March and June of this year was due largely to atypical negative contributions from the non-core component, although core inflation also showed a better performance (see charts 1 and 2). To the extent that the good performance from core prices can be largely justified by weak demand growth, there can be greater confidence that, in the BBVA Research scenario of a moderate but sustained economic recovery, inflation will have reached its cycle lows in the first half of 2011.

Chart 1

Surprises in inflation

Standardized error in the one month forecast for monthly consumer price index



Source: Banxico, Infosel and BVA Research

Chart 2

Surprises in core inflation

Standardized error in the one month forecast for the monthly core index



Source: Banxico, Infosel and BVA Research

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Inflation: costs and expectations

Various theoretic approximations and empiric estimates¹ show that consumer prices perform according to production and distribution costs, exchange rates and the ability of companies to set prices.² In addition to these aspects, we include the 12-month inflation expectation, as this incorporates manufacturers' expectations for future production input costs or price corrections that could be made by competitors.

Estimates are detailed in the appendix, with production and distribution costs found to be the variables with the highest elasticity. Thus, when the nominal wage increases 1%, annual inflation increases 0.4pp. A 1% increase in distribution costs is consistent with 0.2pp growth in general inflation (charts 3 and 4). The relevant weight of the *proxy* variable of distribution activities (transport costs) is consistent with the results of Burstein et al. (2003), which found that in the USA the distribution margin is around 40% of the price to the consumer.



Chart 4 Elasticity of inflation to transport costs 0.90 0.80 0.70 0.60 0.50 0 40 0.30 0.20 0 10 0.00 2 2 9 , h j Ś i Ö ŝ Estimation Max-min interva

Source: BBVA Research. Results of a regression estimation, progressively extending the sample (*rolling regression*).

Source: BBVA Research. Results of a regression estimation, progressively extending the sample (*rolling regression*).

As for 12-month inflation expectations, the estimate shows a moderate effect on the consumer price index, particularly in recent dates (chart 5). Thus, its elasticity is estimated at 0.012. This means that if the 12-month inflation forecast increased from 3.7% to 4.0% (0.3pp increase), annual inflation would increase by 0.1pp, a moderate figure.³ Considering that inflation expectations can approximate what agents discount from expected inflation for their production inputs and those of their competitors, it is unsurprising that current production costs are more important in determining prices than a small change expected in future. The exchange rate also has a small effect (chart 6).

Despite the goodness-of-fit of the adjustment achieved with the stated variables, there is a percentage of unexplained inflation variability, which could be related to erratic or transitory elements (regulations, taxes, problems with the supply of certain products), which simply produce relative price changes in the consumption basket, but no general changes to the inflation process. There is also the possibility that more permanent factors, not included in the estimation, are at work, such as a more competitive environment, for example. In terms of the estimate, additional factors that might be depressing inflation

¹ For example, Burstein et al. (2003), López Marmolejo (2011) and Campa and Goldberg (2005).

² The stated variables are approximated in the estimation with the following: as a dependent variable the national consumer price index, as a *proxy* the marginal cost of nominal wages in the private sector, and for distribution costs we use transport prices. The value of the peso against the dollar is used as the benchmark exchange rate. The estimate period stretches from January 2000 to May 2011, with monthly regularity.

³ The result is obtained from the percentage change in inflation expectations multiplied by estimated elasticity, which indicates the effect on inflation of a change in inflation expectations.

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could be observed in a constant with a weighting that drops over time or in residuals of the estimate below zero. The lower weighting of the constant may indicate that there could be an unobserved factor that has less and less relevance over rising prices, while negative residuals would indicate that the explanatory variables give inflation levels above those finally observed, meaning a negative offsetting variable is missing. However, these effects were not observed (see charts 9 and 10 of the appendix). This fact, together with the persistence of wage cost elasticity, estimates of distribution costs and even the anchoring of expectations, suggests that the pricing process has not undergone recently any significant changes, in particular to the upside. As for any downside changes, only the wage elasticity shows somewhat lower values, based on the most recent sample information, but we believe this is still too small to be considered a structural change. Furthermore, statistical tests do not show such a change for these periods.⁴



Chart 6 Elasticity of inflation to exchange rates

Source: BBVA Research. Results of a regression estimation, progressively extending the sample (*rolling regression*).

Source: BBVA Research. Results of a regression estimation, progressively extending the sample (*rolling regression*).

Max-min interva

Estimation

Inflation and demand: impact of the relation between the costs of production factors and their availability on the market

There is an inverse relationship between inflation and slack in the economy (i.e. the availability of idle resources to satisfy rising demand without generating price tensions), making the economic cycle one of the key factors explaining the performance of prices. There is a greater availability of production factors in periods of low economic activity, meaning the price paid for these factors tends to fall. For example, wages tend to grow at a slower rate during such periods, making it reasonable to identify an inverse relationship between the unemployment rate (proxy for resources available in the labor market) and changes in wage levels (Chart 7).⁵ In turn, if the change in wages is negative, household income is limited and so, as a result, is their propensity to consume, making for a direct relation between this two variables. The level of slack in the economy and its relation to wages is also observed in the positive relationship between the output gap (i.e. percentage difference between the production level observed in the economy and its potential output) and changes to wages (chart 8).

In sum, it seems that the recent good performance from inflation is largely due to the availability of resources in the economy and not a change in the process of price formation. Therefore, to the extent that employment remains too weak to significantly lower the unemployment rate and trigger a recovery in household income and consumption, to a level at which companies would have greater

⁴ The Zivot-Andrews test shows no structural changes to the various series in recent periods.

⁵ Real wages were used in the charts instead of nominal wages, as an increase in wages above inflation would be a clearer sign of bargaining power held by workers relative to other prices, which would indicate lower availability of labor market resources. Furthermore, one of the slack variables used for comparison is also real, the output gap.

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price setting capacity, demand pressure will remain scarce. Thus, the main inflationary risks would come from possible supply shocks, such as an increase in costs due to less availability of raw materials, which could generate indirect and even second-round impacts that would finally cause a general increase in prices.

Chart 7

Change in real wages and unemployment rate (% ch. y-o-y and % of labor force, respectively)



Source: IMSS and BBVA Research

Chart 8

Change in real wages and production gap (% ch. y-o-y and percentage, of potential GDP, respectively)



Source: Banxico and BBVA Research

Appendix

An estimate is made for differences in the variables, as most of the series follow a unitary root process, and this transformation allows an estimate for a stationary process that yields consistent results. The estimates are as follows:

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Table 1

Factors determining inflation in Mexico

		∆12log(Core
	∆12log(CPI)	Index)
∆12log(Wages)	0.392**	0.440**
	(13.89)	(12.72)
Δ12log(Exchange Rate)	0.0272**	0.00657
	(3.53)	(0.72)
Δ12log(Transport Prices)	0.180**	0.166**
	(5.81)	(4.21)
Δ 12log(12 months inflation expectations)	0.0117**	0.0121**
	(2.46)	(2.69)
Constant	0.0131**	0.00807**
	(7.11)	(2.79)
Observations	136	136
R-squared	0.804	0.792
"t" statistic in parenthesis. Sample 2000-2011.		

** significant at 5%; * significant at 10%. Δ12 indicates 12 month differences.

Source: BBVA Research

The fact that the constant is positive and that errors hold near zero, indicates that there are apparently no unobserved elements that are gradually reducing inflation, which would be in addition to the effects identified via the explanatory variables (Figures 9 and 10).



Source: BBVA Research

Source: BBVA Research

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Although the estimated residuals are around zero, and the goal of the analysis is to identify the main determinants of inflation, similar models were estimated that included in their control variables the lagged inflation, which incorporates price inertia. No structural change is observed either in the models with price lags as control variables. This seems to further indicate that price formation remains driven by the same determinant factors, while inflationary surprises in the last two years are due to both an underestimation of the effects of the financial crisis and an overestimation of the impact had by fiscal changes introduced in 2010.

References

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